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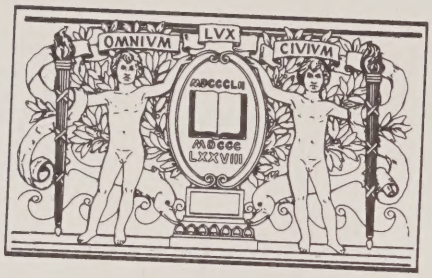

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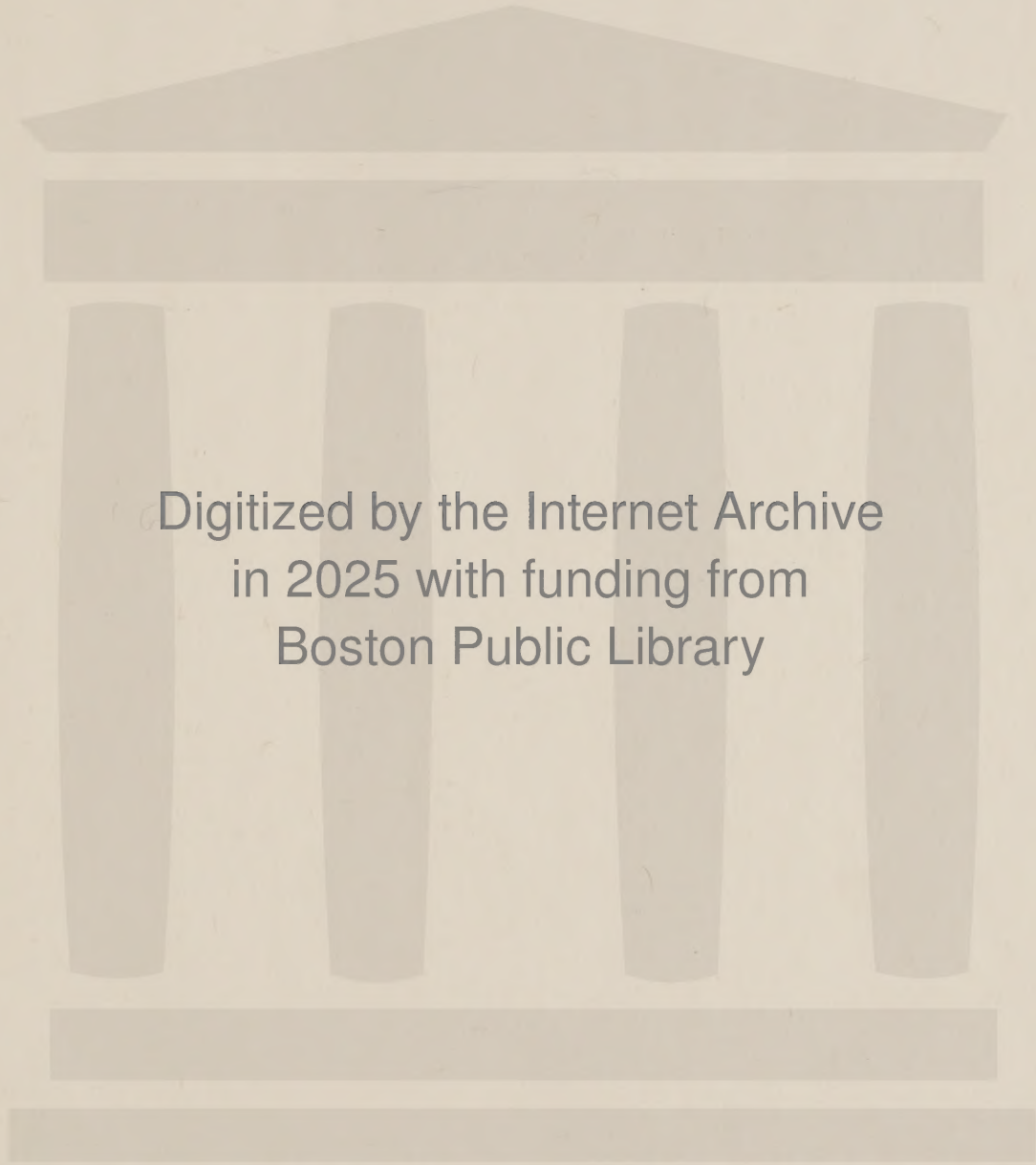

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A Study of Logan Airport

May 9, 1986

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Summary

Logan Airport is the eleventh busiest airport in the world and is growing at a faster pace than many of the top ten. Passengers at Logan doubled in the last 12 years and are expected to double again in the next 20 years. Air cargo, particularly international freight, is also booming while commercial development at Logan has been planned to complement business use. The economic, employment, and fiscal benefits of Logan's boom has been good for Boston and the region but the costs of growth must also be recognized and remedied. A list of primary costs include: ground access problems, traffic congestion, parking shortages and noise as well as constraints on terminal space, baggage and cargo handling facilities, and passenger services.

Massport is currently pursuing long-range and short-range remedies for the problems of capacity at Logan Airport. The long-rang solutions include the Harbor Tunnel/Artery project and a Regional Airports Strategy designed to reduce traffic problems and spread Logan's growth across the region. In the short-run Massport is trying many new projects to encourage transit use and off-site parking as well as respond to air traffic noise problems. Future growth at Logan will benefit Boston even more and accommodate business, convention and tourist growth in the City. This growth, however, will only bring benefits if current problems and future are met by visionary planning solutions.

I. Logan Airport Compared To Other U.S. And World Airports

Logan Airport in Boston is one of the busiest airports in the world. In 1985 Logan Airport ranked eleventh of all world airports in terms of total commercial passengers with 19.4 million. Of the ten busier airports, nine were American airports (O'Hare in Chicago ranked first) and only one airport was outside of America (Heathrow in London ranked sixth). Also in 1985 Logan airport ranked in the top twenty airports in the world on the other two measures of cargo and flights: Logan ranked seventeenth in total cargo tonnage shipped with 303,960 metric tons and nineteenth in total flights with 341,701 takeoffs and landings.

In 1984, Logan airport also ranked eleventh in total passengers but rated lower in the other two categories, ranking twenty-fifth in total cargo and nineteenth in total flights. Between 1984 and 1985 Logan passengers rose 8.8 percent, cargo shipments rose 78 percent, and total flights rose 8.6 percent. The only airports of the top ten to grow faster than Logan in total passengers served between 1984 and 1985 were Newark (35.9 percent), Dallas (20.5 percent) Stapleton in Denver (14.1 percent), and Heathrow in London (9.0 percent).

Boston's Logan Airport has five of the 61 busiest air passenger routes in America according to a 1985 sample survey. In fact, the Boston-New York route is the single most heavily travelled route in America. The other major Boston routes were: Boston-Washington (27th), Boston-Chicago (45th) Boston-Philadelphia (51st), and Boston-Los Angeles (61st). Only airports in New York, Newark, Chicago, and Los Angeles had a greater number of heavily travelled air passenger routes out of the top 60.

Although about 10 cities have more than one airport very few cities have two or more that rank in the world's top 100 busiest airports. Only New York, Washington, Houston, and Dallas have two airports in the top 100. However, considering metropolitan or regional areas, a larger number

have two or more busy airports: New York (3), Los Angeles (3), Washington (3), San Francisco/Oakland/San Jose (3), Miami/Ft. Lauderdale/Palm Beach (3), Houston (2), and Dallas (2).

Without a detailed review there is no way to determine which major U.S. airports are directly in residential areas. Most airports do have a noise and traffic impact upon residential areas because of their size and the proximity of flight patterns. It can be assumed that airports which are farther from their city center or in smaller metro areas have less of an effect. Several major airports which are in industrial or remote areas include: O'Hare in Chicago, Kennedy in New York, and Dallas/Fort worth.

II. Boston-Logan Airport Growth Projections

Between 1975 and 1985 total passengers served by Logan Airport nearly doubled from 10.5 million to 19.4 million. Growth rates approached ten percent annually in several years over the last decade, registering a 9 percent rate for 1984-1985. Preliminary 1986 figures show a 5 to 6 percent rise. While no detailed future projection are done by Massport they do have short-term and long-term estimates. Short-term (five years) projections are for 5 percent annual growth and long-term (twenty year) projections are for 1.5 percent annual growth. Massport's Planning Department expects air passenger travel to double (40 million) in another 20 years.

Logan Airport's air travel facilities are not currently planned for major expansion. No new runways are planned to be built. Expansion of terminal E is being considered and a feasibility study is presently in progress. With the major expansion and improvement of facilities over the last twenty years Logan Airport is an adequate modern airport. Logan Airport can handle all new jets built to date and has even accommodated the Concorde supersonic jet on an occasional emergency situation from New York. See the final section for a discussion of a regional airport strategy and alternatives for a new airport.

Massport's capital planning for future growth is primarily based upon improvement of existing air traffic facilities (terminals, safety noise control, etc) as well as ground transportation access improvements.

III. Logan Air Cargo Shipments

Air cargo is becoming an increasingly larger component of Logan Airport's activity. Logan has entered the list of top twenty airports handling domestic and international shipments. Air cargo, which include mail and freight, increased in total pounds by 31 percent between 1980 and 1985. In 1985 domestic cargo totalled 497 million pounds consisting of 110 million pounds of mail (22%) and 387 million pounds of freight (78%). International cargo in 1985 totalled 169 million pounds consisting of 10 million pounds of mail (6%) and 159 million pounds of freight (94%). Therefore, the domestic and international shares of total cargo were 75% and 25%. Over the last five years the share of international cargo has increased modestly as a percentage of total shipments.

Air freight is comprised mainly of goods that have high value to weight ratio which includes items such as precious metals, communications equipment, computers, instruments, machinery, pharmaceuticals, and medical supplies. Boston, as an economy specializing in high-technology, medical, and other high value products, is well-suited to use air freight services. Air mail shipments are also booming, accommodated by the proliferation of courier delivery services which provide the quick, efficient handling of packages generated largely by financial, professional, and business services.

An international air freight study done by Data Resources Inc. for Massport analyzed the size, value, and geography of imported and exported goods at Logan Airport in 1983. Logan ranked as the sixth largest internation air-freight gateway in the U.S. behind New York, Los Angeles, San Francisco, Chicago, and Miami. Together, these six cities accounted for 90 percent of

all American international air freight. Although Boston's poundage shipments of exports to imports was about even (68 to 63 million) the value of export to import shipments was much greater ($2.1 billion to $937 million). While American international air freight was more evenly distributed among Europe, Asia, and other continents about 80 percent of all of Boston's shipments were to Europe. In particular the United Kingdom, Germany, Canada, Switzerland, France, Italy and Ireland accounted for about three-quarters of all exports and imports combined. Exports form Logan to foreign countries were dominated by computers, measuring instruments, communications and telephone equipment, air craft engines and parts, precious metals, and other machinery. Imports, less than half of export value, were more widely dispersed among products including electrical equipment, business machinery, scientific instruments, optical goods, pharmaceuticals, leather goods, and other products.

Domestic freight accounts for 75 percent of all Logan freight. No detailed analysis of domestic freight is available although a study of goods and destinations is currently underway. It is estimated that Boston probably ships out a higher value of finished goods than it receives of intermediate goods because of Boston's specialization in high technology industries. A detailed analysis of domestic freight will be received from Massport when completed.

Massport, recognizing the growth of air cargo, is currently pursuing development of facilities at Logan Airport to accommodate air freight operations. Development at the 90 acre site called Logan South is designed to consolidate air freight facilities, upgrade freight handling capacity, improve cargo services, and complement trade through related commercial developments. These efforts are designed to create more efficiencies and to promote business activity.

IV. Regional Air Service Strategy

Massport and the Commonwealth of Massachusetts are pursuing a regional air service strategy. While future capacity at Logan is limited and long-term projections show a near full utilization of facilities, the development of auxiliary state and regional airports is viewed as necessary. The Massachusetts Aeronautics Commission and Massport are looking to other airport locations which could take some strain of growth off Logan as well as reap some economic benefits. Worcester Municipal Airport has been the focus of the most attention as the center of a significant market while other sites are also receiving attention. After years of limited progress, airports at Worcester, Providence, Manchester (N.H.), and Portland have begun to get busier but issues of modernization and expansion will need to be addressed.

Hanscom Field, located 18 miles from Boston in Bedford, Massachusetts, is the closest airport to Logan. It primarily serves corporate passengers and general aviation service. Hanscom was built as a military airbase and can accommodate larger aircraft, as well. Attempts to use Hanscom as a commercial airport have met with little success because of surrounding residential neighborhoods, lack of large commercial service facilities, and ground transportation difficulties. Recent improvements of hangers, towers, instrumentation, and other facilities are greatly improving Hanscom's capabilities for handling corporate and leisure aircraft. In 1985 Hanscom's flights increased by 7 percent.

In the Eastern New England region there are four major airports other than Logan which are part of a regional strategy to spread air transportation services more efficiently for passenger convenience: Worcester Municipal Airport, T.F. Green Airport in Providence, Manchester Airport in southern New Hampshire, and Portland Airport in southern Maine. Until about three years ago these airports were not growing like Logan in Boston primarily because of

the lack of competitively priced service and convenient commercial airline schedules. Since 1983, however, these airports have grown in use following upgraded service. Air passengers nearly doubled between 1982 and 1985 in Providence and Portland, while Worcester and Manchester have also shown gains.

For the future several factors are important considerations in the success of a regional airports strategy:

1. Most of the regional airports will need modernization and/or expansion with increased use.
2. Airline carriers, routes, and pricing will have a strong effect upon use of regional airports.
3. Individual consumer habits in using airports will need to change.
4. The ground access issues of Logan airport will affect use of other sites.
5. Logan Airport will continue to dominate the region because of its diversity of airlines and flights, international travel, and coast-to-coast and non-stop domestic services.

The possibility of an alternative site near Boston for a new airport does not seem to be a popular alternative. Little mention is made of this by Massport most likely because of the few large quality sites and proximity of neighborhoods and towns. New airports are expensive to develop, too. Fiscally, FAA funding only applies to tower and control facilities while land and infrastructure are usually funded by bonds. Massport funds most of its capital improvements by revenue bonds which usually go to expansion and modernization of existing facilities. It is doubtful that Massport would or could use new revenue bonds to develop a new airport or that regional cooperation on general obligation bonds would work.

V. Ground Access, Traffic, and Parking At Logan Airport

A major challenge to the continued growth and efficiency of Logan Airport are the problems of ground access, traffic congestion, and parking. The 85 percent rise in commercial passengers over the last decade has intensified vehicle use on limited transportation facilities. Massport planners acknowledge that present and future use of Logan makes congestion the "major threat to the economic health of the entire region." Accordingly Massport is pursuing efforts to address the problems of ground transportation.

The Massachusetts office of Environmental Affairs has ordered Massport to prepare a Logan Ground Access Improvement Study E.I.R. as a planning document analyzing conditions and suggesting actions. This final report is not yet available but will be provided upon completion. In the meantime a few items of technical data are available for review from a background study. Logan Airport generates 81,200 person-trips on the average day up by 22,800 (39 percent) in five years. The modal split of person-trips is: 69% private care, 13% taxi and limousine, 9% MBTA and bus, 7% rental car, and 2% other. This mode use has remained virtually constant over the 5 year period. Total person-trips is separated into three categories: 58% air passengers, 25% employee commuters, and 17% employee midday trips. The greatest number of auto trips originated within route 128 particularly from the North Shore. The most transit trips were generated in Downtown Boston and the near North Shore. In summary, this report showed that auto use increased at almost the same rate as growth of Logan's air services and that transit use was not becoming more popular.

The major long-term solution to ground access problems is the $2.2 billion third Harbor Tunnel/Centeral Artery Depression project. Since this project would only be completed in 10 to 12 years at the earliest other immediate remedies are being pursued.

1. Improving terminal access, parking, circulation, baggage, and cargo services.
2. Streamlining the airport roadway.
3. Advertising public transportation
4. Using free bus service from the T stop to terminals
5. Developing water taxi service between the airport, downtown, and the South Shore.
6. Building the Red line-Blue line transit connector.

Specific long term strategies include

1. Planning for the Harbor Tunnel/Artery project.
2. Pursuing a Regional Airports strategy
3. Planning for satellite terminals and people movers.

The other major ground access problem is parking. In 1984 Logan was served by 9,500 off street public parking spaces at the airport, 3,000 parking spaces off-site from Logan in East Boston, and 5,900 employee parking spaces. In addition support spaces for taxis, etc. totaled 600 and car rental spaces numbered 2600. A total of 20,600 parking spaces is currently provided for all airport related uses. The specific problem is public lots and garages subject to the freeze of 10,400 spaces. Over the Thanksgiving Day weekend in 1985 public space were completely filled on two days. Massport has been promoting park-and-ride at off-site, remote, reduce-rate parking lots in suburban locations with use of express shuttle buses. The other public transportation promotion efforts are designed to reduce auto use but have met with limited success so far. Clearly ground access issues are crucial problems to the future growth of Logan Airport.

LOGAN AIRPORT STUDY

APPENDIX TABLES AND REPORTS

APPENDIX TABLES AND REPORTS

TABLES

1. Data for metro. regions with 2 or more major airports.
2. Metro regions with 2 or more major airports with distance from downtown.
3. Cities with only 1 major airport with distance from downtown.
4. Boston-Logan air activity data summary.
5. 1985, world airport passenger/cargo rankings (top 26).
6. 1985, busiest American air passenger routes.
7. 1984, world airport passenger/cargo rankings (top 100).
8. Boston-Logan detailed air traffic statistics, 1980-1985.
9. Boston-Logan statistics summary, 1960-1978.
10. Excerpt from "International Air Freight Study for Logan International Airport," by Data Resources, Inc., 1983.
11. Excerpt from "Logan Ground Access Improvements Study, 1985, Technical Memorandum #1, Existing 1984 Conditions: User Characteristics and Travel Behavior," prepared for Massport by Jane Howard, March 1985.
12. Inventory of parking facilities at Logan Airport, May 1980.
13. Summary of American Air transportation statistics, 1984. From U.S. Statistical Abstract, 1986.

REPORTS

1. "Massport, 1985: Taking New England to the Future," Annual Report of Massport, 1985.
2. "Background Information on Logan Airport," B.R.A. memorandum by Alf Howard. September, 1985.
3. "Logan Ground Access Improvements Study, 1985, Technical Memorandum #1, Existing 1984 Conditions: User Characteristics and Travel Behavior," prepared for Massport by Jane Howard. March 1985.

FORTHCOMING REPORTS

1. "Logan Ground Access Improvements Study, 1985," Massport Planning Department, draft in progress, 1986.
2. A study of domestic air freight at Logan Airport. In progress, 1986.

AIR TRANSPORTATION DATA FOR METRO REGIONS WITH MORE THAN ONE OF THE WORLD'S 100 BUSIEST AIRPORTS, 1984

	Passengers	Total Cargo Tons	Total Flights
New York	64,129,124 (1)	1,445,740 (1)	896,684 (2)
Los Angeles	39,067,834 (2)	886,670 (2)	1,171,743 (1)
Dallas	32,055,795 (3)	334,546* (5)	742,765 (6)
San Francisco (Oakland, San Jose)	29,631,537 (4)	513,663 (4)	1,065,487 (2)
Miami (Ft. Lauderdale, Palm Beach)	28,751,526 (5)	567,678 (3)	798,628 (4)
Washington	22,238,097 (6)	217,776 (6)	749,157 (5)
Houston	18,078,341 (7)	78,848 (7)	631,115 (7)

Number of Regional Airports

New York - 3
Los Angeles - 3
Dallas - 2
San Francisco/Oakland/San Jose - 3
Miami/Ft. Launderdale/Palm Beach - 3
Washington - 3
Houston - 2

RES10/K/050986

CITIES OR METRO REGIONS WITH 2 OR MORE OF THE WORLDS 100 BUSIEST AIRPORTS, 1984. (INCLUDING DISTANCE FROM DOWNTOWN

NEW YORK (2 CITY, 1 METRO)
- KENNEDY INTERNATIONAL (15 MILES)
- LAGUARDIA (8 MILES)
- NEWARK INTERNATIONAL (16 MILES)

WASHINGTON (1/3 CITY, 2/3 METRO)
- NATIONAL (3 MILES)
- DULLES (26 MILES)
- BALTIMORE/WASHINGTON (32 MILES)

LOS ANGELES (1 CITY, 2 METRO)
- L.A. INTERNATIONAL (17 MILES)
- BURBANK/GLENDALE/PASADENA (15 MILES)
- JOHN WAYNE (N/A - SANTA ANA)

HOUSTON (2 CITY)
- INTERCONTINENTAL (20 MILES)
- HOBBY (10 MILES)

DALLAS (1 CITY, 1 METRO)
- LOVE FIELD (6 MILES)
- DALLAS/FORT WORTH AIRPORT (13 MILES)

SAN FRANCISCO (1 CITY, 2 METRO/REGION)
- S.F. INTERNATIONAL (16 MILES)
- OAKLAND INTERNATIONAL (18 MILES)
- SAN JOSE ~~INTERNATIONAL~~ MUNICIPAL (N/A)

MIAMI-PALM BEACH-FORT LAUDERDALE (1 CITY, 2 METRO)
- MIAMI INTERNATIONAL (7 MILES)
- PALM BEACH INTERNATIONAL (NA)
- FORT. LAUDERDALE/HOLLYWOOD (NA)

CITIES WITH ONE AIRPORT OF THE WORLDS 100 BUSIEST, 1984
(INCLUDING DISTANCE FROM DOWNTOWN)

CHICAGO - O'HARE INTERNATIONAL (18 MILES)
ATLANTA - HARTSFIELD INTERNATIONAL (9 MILES)
DENVER - STAPLETON INTERNATIONAL (6.5 MILES)
BOSTON - LOGAN INTERNATIONAL (3 MILES)
ST. LOUIS - LAMBERT INTERNATIONAL (15 MILES)
HONOLULU - HONOLULU INTERNATIONAL (N/A)
PITTSBURGH - GREATER PITTSBURGH INTERNATIONAL (17 MILES)
SEATTLE - SEA-TAC INTERNATIONAL (13 MILES)
LAS VEGAS - McCARRAN INTERNATIONAL (7 MILES)
DETROIT - DETROIT METROPOLITAN WAYNE COUNTY (20 MILES)
PHILADELPHIA - PHILADELPHIA INTERNATIONAL (7 MILES)
MINNEAPOLIS - MINNEAPOLIS/ST. PAUL INTERNATIONAL (10 MILES)
PHOENIX - SKY HARBOR INTERNATIONAL (3 MILES)
TAMPA - TAMPA INTERNATIONAL (5 MILES)
ORLANDO - ORLANDO INTERNATIONAL (8 MILES)
CHARLOTTE - CHARLOTTE/DOUGLAS INTERNATIONAL
SALT LAKE CITY - SALT LAKE CITY INTERNATIONAL (3 MILES)
SAN DIEGO - SAN DIEGO INTERNATIONAL (N/A)
NEW ORLEANS - NEW ORLEANS INTERNATIONAL (N/A)
CLEVELAND - CLEVELAND/HOPKINS INTERNATIONAL
KANSAS CITY - KANSAS CITY INTERNATIONAL
MEMPHIS - MEMPHIS INTERNATIONAL
PORTLAND, OREGON - PORTLAND INTERNATIONAL
SAN ANTONIO - SAN ANTONIO INTERNATIONAL
CINCINNATI - GREATER CINCINNATI INTERNATIONAL
KAHULUI, HAWAII - KAHULUI AIRPORT
BUFFALO - GREATER BUFFALO INTERNATIONAL
HARTFORD - BRADLEY INTERNATIONAL (WINDSOR LOCKS)
COLUMBUS, OHIO - ~~GREATER~~ PORT COLUMBUS INTERNATIONAL
ALBUQUERQUE - ALBUQUERQUE INTERNATIONAL
MILWAUKEE - GENERAL MITCHELL FIELD
INDIANAPOLIS - INDIANAPOLIS INTERNATIONAL
NORFOLK, VIRGINIA - NORFOLK INTERNATIONAL
RENO, NEVADA - CANNON INTERNATIONAL
ANCHORAGE, ALASKA - ANCHORAGE INTERNATIONAL

AIRPORT ACTIVITY COMPARISONS: PASSENGERS, CARGO, FLIGHTS

LOGAN AIRPORT VS. OTHER WORLD AIRPORTS

BOSTON-LOGAN (1985)

RANKED #11 IN THE WORLD IN COMMERCIAL PASSENGERS
RANKED #17 IN THE WORLD IN TOTAL CARGO TONNAGE SHIPPED
RANKED #19 IN THE WORLD IN TOTAL FLIGHTS

BOSTON-LOGAN (1984)

RANKED #11 IN THE WORLD
RANKED #25 IN THE WORLD
RANKED #19 IN THE WORLD

ONLY WORLD CITY AIRPORT OUTSIDE THE U.S. THAT CARRIES MORE PASSENGERS IS HEATHROW AIRPORT IN LONDON.

MOST HEAVILY TRAVELLED AMERICAN AIR ROUTES - PASSENGERS

BOSTON-LOGAN HAS 5 OUT OF THE1 TOP 61 ~~HEAVIEST~~ BUSIEST ~~TRAVELLED~~ AIR-PASSENGER ROUTES ACCORDING TO A 1985 SAMPLE SURVEY.

THE BOSTON – NEW YORK ROUTE IS THE SINGLE MOST HEAVILY TRAVELLED ROUTE IN THE U.S.

MAJOR ROUTES INCLUDING BOSTON IN THE TOP 61 AND THEIR RANKING:

1. BOSTON - NEW YORK
27. BOSTON - WASHINGTON
45. BOSTON - CHICAGO
51. BOSTON - PHILADELPHIA
61. BOSTON - LOS ANGELES

1985 TOP 27

1785

0. WORLD AIRPORT PASSENGER/CARGO RANKING BY ORDER

	AIRPORT	TOTAL PASSENGERS	TOTAL CARGO MAIL/FREIGHT (Top 100 Ranked)		TOTAL OPERATIONS (Top 100 Ranke
1	O'Hare International Chicago, Illinois	45,725,939	615,029	(6)	731,742
2	Hartsfield Atlanta International Atlanta, Georgia	38,989,314	513,731	(9)	689,484
3	Los Angeles International Los Angeles, California	34,361,715	860,379	(3)	550,755
4	Dallas/Ft. Worth Airport Dallas/Ft. Worth, Texas	32,267,444	334,480	(15)	525,452
5	Kennedy International Jamaica, New York	29,934,779	1,258,365	(1)	306,737
6	Heathrow Airport London, England	29,147,200	612,200	(7)	298,300
7	Stapleton International Denver, Colorado	28,806,349	194,774	(29)	515,489
8	San Francisco International San Francisco, California	24,192,895	346,054	(14)	401,970
9	Newark International Newark, New Jersey	23,654,163	248,198	(22)	345,171
0	La Guardia Flushing, New York	20,302,511	93,363	(51)	343,080
1	Boston-Logan International Boston, Massachusetts	19,417,972	303,960	(17)	341,701
2	Miami International Miami, Florida	19,328,057	512,537	(10)	352,585
3	Frankfurt/Main Frankfurt, West Germany	18,319,305	833,480	(4)	242,199
4	Osaka International Osaka, Japan	17,669,899	303,539	(19)	127,228
5	Orly Airport Paris, France	17,174,397	242,528	(23)	155,483
6	Lambert-St. Louis International St. Louis, Missouri	16,628,584	85,636	(53)	396,065
7	Honolulu International Honolulu, Hawaii	16,559,673	230,134	(25)	343,818
8	Toronto International Toronto, Canada	14,752,499	N/A		247,218
9	Washington National Airport Washington, D.C.	14,573,558	64,184	(67)	337,538
0	Gatwick Airport London, England	13,953,600	153,900	(37)	158,800
1	Charles de Gaulle Paris, France	13,628,105	528,968	(8)	135,187
2	Greater Pittsburgh International Pittsburgh, Pennsylvania	13,414,626	70,902	(63)	352,106
3	Houston Intercontinental Houston, Texas	12,807,085	N/A		328,562
4	Detroit Metropolitan Wayne County Detroit, Michigan	11,685,189	137,693	(42)	326,270
5	Mexico City International Mexico City, Mexico	11,481,024	64,953	(66)	188,610
6	Sea-Tac International Seattle, Washington	10,477,166	230,639	(24)	223,828
7	Philadelphia International	10,286,281	166,749	(36)	344,137

CITY-PAIR RANK	PAIR MILE	CITY PAIR		TRAFFIC IN SAMPLE OUTBOUND PLUS INBOUND PASSENGERS NUMBER	PERCENT OF TOTAL	CUMULATIVE PERCENT OF TOTAL	NUMBER OF PASSENGER MILES
1	29	BOSTON, MASSACHUSETTS	NEW YORK, NEW YORK	417484	1.78	1.78	80660292
2	5	CHICAGO, ILLINOIS	NEW YORK, NEW YORK	316218	1.35	3.12	231460325
3	36	NEW YORK, N.Y./NEWARK, N.J.	WASHINGTON, D.C.	310016	1.32	4.44	69276200
4	1	LOS ANGELES, CALIFORNIA	NEW YORK, NEW YORK	307391	1.31	5.75	765267109
5	46	DALLAS-FORT WORTH, TEXAS	HOUSTON, TEXAS	230576	0.98	6.73	53629845
6	4	MIAMI, FLORIDA	NEW YORK, NEW YORK	223753	0.95	7.68	269978318
7	34	LOS ANGELES, CALIFORNIA	SAN FRANCISCO, CALIF	200208	0.85	8.54	68230195
8	6	FORT LAUDERDALE, FLORIDA	NEW YORK, NEW YORK	167975	0.71	9.25	180368718
9	73	BUFFALO, NEW YORK	NEW YORK, NEW YORK	149226	0.64	9.89	42618941
10	2	NEW YORK, N.Y./NEWARK, N.J.	SAN FRANCISCO, CALIF	144410	0.61	10.50	380399456
11	10	NEW YORK, N.Y./NEWARK, N.J.	WEST PALM BEACH, FLA.	142201	0.61	11.11	146803022
12	65	NEW YORK, N.Y./NEWARK, N.J.	PITTSBURGH, PENNA.	135964	0.58	11.68	66268105
13	38	DETROIT/ANN ARBER, MICHIGAN	NEW YORK, NEW YORK	126695	0.54	12.22	63084981
14	7	HOUSTON, TEXAS	NEW YORK, NEW YORK	121380	0.52	12.74	173768968
15	338	HONOLULU, OAHU, HAWAII	KAHULUI, MAUI, HAWAII	121050	0.52	13.25	12165690
16	79	CHICAGO, ILLINOIS	MINNEAPOLIS, MINN.	115838	0.49	13.75	39875788
17	19	NEW YORK, N.Y./NEWARK, N.J.	ORLANDO, FLORIDA	115686	0.49	14.24	110214424
18	18	NEW YORK, N.Y./NEWARK, N.J.	TAMPA, FLORIDA	111671	0.48	14.72	112843961
19	3	HONOLULU, OAHU, HAWAII	LOS ANGELES, CALIF.	105862	0.45	15.17	272389507
20	12	DALLAS-FORT WORTH, TEXAS	NEW YORK, NEW YORK	99571	0.42	15.59	340569988
21	31	ATLANTA, GEORGIA	NEW YORK, NEW YORK	99075	0.42	16.01	76638481
22	124	NEW YORK, N.Y./NEWARK, N.J.	NORFOLK, VIRGINIA	97935	0.42	16.42	28133494
23	93	LOS ANGELES, CALIFORNIA	PHOENIX, ARIZONA	94884	0.40	16.83	35209670
24	75	SAN DIEGO, CALIFORNIA	SAN FRANCISCO, CALIF	94340	0.40	17.23	42260898
25	171	LAS VEGAS, NEVADA	LOS ANGELES, CALIF.	91739	0.39	17.62	21676406
26	9	DENVER, COLORADO	NEW YORK, NEW YORK	89327	0.38	18.00	147929834
27	92	BOSTON, MASSACHUSETTS	WASHINGTON, D.C.	89267	0.38	18.38	35920678
28	183	HOUSTON, TEXAS	NEW ORLEANS, LA.	86845	0.37	18.75	26209100
29	80	COLUMBUS, OHIO	NEW YORK, NEW YORK	84518	0.36	19.11	39760588
30	485	DALLAS-FORT WORTH, TEXAS	SAN ANTONIO, TEXAS	82732	0.35	19.46	20433701
31	206	CHICAGO, ILLINOIS	DETROIT, MICHIGAN	81927	0.35	19.81	14820290
32	52	CHICAGO, ILLINOIS	WASHINGTON, D.C.	80711	0.34	20.15	50241343
33	498	HONOLULU, OAHU, HAWAII	LIHUE, KAUAI, HAWAII	79603	0.34	20.49	8307777
34	264	NEW YORK, N.Y./NEWARK, N.J.	SYRACUSE, NEW YORK	79167	0.34	20.83	15563633
35	278	AUSTIN, TEXAS	DALLAS-FORT WORTH, TX	79067	0.34	21.16	14482732
36	37	CHICAGO, ILLINOIS	DALLAS-FORT WORTH, TX	78827	0.34	21.50	64659468
37	103	CLEVELAND, OHIO	NEW YORK, NEW YORK	78304	0.33	21.83	32600956
38	30	MINNEAPOLIS/ST. PAUL, MINNESOTA	NEW YORK, NEW YORK	76223	0.32	22.16	97994361
39	15	CHICAGO, ILLINOIS	LOS ANGELES, CALIF.	75421	0.32	22.48	137683400
40	22	HOUSTON, TEXAS	LOS ANGELES, CALIF.	70289	0.30	22.78	94689024
41	239	CHICAGO, ILLINOIS	ST. LOUIS, MISSOURI	64826	0.28	23.05	16822895
42	154	LOS ANGELES, CALIFORNIA	SAN JOSE, CALIFORNIA	64280	0.27	23.32	19824992
43	69	SAN FRANCISCO, CALIFORNIA	SEATTLE/TACOMA, WASH.	63491	0.27	23.60	63428067
44	50	JACKSONVILLE, FLORIDA	NEW YORK, NEW YORK	62526	0.27	23.86	52117561
45	45	BOSTON, MASSACHUSETTS	CHICAGO, ILLINOIS	62320	0.27	24.13	94900912
46	186	BURBANK, CALIFORNIA	SAN FRANCISCO, CALIF	62080	0.26	24.39	20366154
47	8	HONOLULU, OAHU, HAWAII	SAN FRANCISCO, CALIF	62077	0.26	24.65	150213010
48	378	LOS ANGELES, CALIFORNIA	OAKLAND, CALIFORNIA	61396	0.26	24.92	20699024
49	42	LOS ANGELES, CALIFORNIA	SEATTLE/TACOMA, WASH.	61371	0.26	25.18	58347990
50	11	LOS ANGELES, CALIFORNIA	WASHINGTON, D.C.	59743	0.25	25.43	140573407
51	249	BOSTON, MASSACHUSETTS	PHILADELPHIA, PENNA.	59767	0.25	25.68	16296209
52	322	HILO, HAWAII, HAWAII	HONOLULU, OAHU, HAWAII	59728	0.25	25.92	12637150
53	47	CHICAGO, ILLINOIS	DENVER, COLORADO	59084	0.24	26.17	52936920
54	279	NEW YORK, N.Y./NEWARK, N.J.	ROCHESTER, NEW YORK	57069	0.24	26.41	14610090
55	224	CHICAGO, ILLINOIS	CLEVELAND, OHIO	56401	0.24	26.65	17775031
56	90	DALLAS-FORT WORTH, TEXAS	DENVER, COLORADO	55526	0.24	26.89	36614366
57	87	CHICAGO, ILLINOIS	PHILADELPHIA, PENNA.	54957	0.23	27.12	57654133
58	147	GREENSBORO/HIGH POINT, N. C.	NEW YORK, NEW YORK	53371	0.23	27.35	24239536
59	108	DENVER, COLORADO	PHOENIX, ARIZONA	52819	0.22	27.57	31441949
60	62	DENVER, COLORADO	LOS ANGELES, CALIF.	52459	0.22	27.79	45204459
61	13	BOSTON, MASSACHUSETTS	LOS ANGELES, CALIF.	52355	0.22	28.02	138632004
62	412	MIAMI, FLORIDA	ORLANDO, FLORIDA	52266	0.22	28.24	10095510
63	39	CHICAGO, ILLINOIS	MIAMI, FLORIDA	52046	0.22	28.46	63024146
64	391	MIAMI, FLORIDA	TAMPA, FLORIDA	51801	0.22	28.68	10585699
65	260	PHOENIX, ARIZONA	SAN DIEGO, CALIFORNIA	51574	0.22	28.90	15719971
66	339	DALLAS-FORT WORTH, TEXAS	TULSA, OKLAHOMA	51080	0.22	29.12	12134581
67	722	LOS ANGELES, CALIFORNIA	SAN DIEGO, CALIFORNIA	50532	0.22	29.33	5508617
68	674	BALTIMORE, MARYLAND	NEW YORK, NEW YORK	49991	0.21	29.55	3761412
69	214	LOS ANGELES, CALIFORNIA	SACRAMENTO, CALIF.	49814	0.21	29.76	18610123
70	215	ORANGE CO/SNTA ANA/ANAHEIM, CAL	SAN FRANCISCO, CALIF	49743	0.21	29.97	18569565
71	441	HOUSTON, TEXAS	SAN ANTONIO, TEXAS	49321	0.21	30.18	9458152
72	111	ATLANTA, GEORGIA	CHICAGO, ILLINOIS	48770	0.21	30.39	30864033
73	558	AUSTIN, TEXAS	HOUSTON, TEXAS	48677	0.21	30.59	7289753
74	298	NEW YORK, N.Y./NEWARK, N.J.	PORTLAND, MAINE	48627	0.21	30.80	23733713
75	168	DALLAS-FORT WORTH, TEXAS	NEW ORLEANS, LA.	48515	0.21	31.01	21969623
76	24	CHICAGO, ILLINOIS	SAN FRANCISCO, CALIF	48410	0.21	31.21	94091569
77	40	DALLAS-FORT WORTH, TEXAS	LOS ANGELES, CALIF.	48268	0.21	31.42	61800173
78	23	DETROIT/ANN ARBER, MICHIGAN	LOS ANGELES, CALIF.	48218	0.21	31.62	97260834
79	493	HONOLULU, OAHU, HAWAII	KONA, HAWAII, HAWAII	48112	0.20	31.83	8361200
80	199	CHICAGO, ILLINOIS	KANSAS CITY, MISSOURI	47522	0.20	32.03	19608904
81	57	CHICAGO, ILLINOIS	TAMPA, FLORIDA	46720	0.20	32.23	48184572
82	67	MIAMI, FLORIDA	WASHINGTON, D.C.	46669	0.20	32.43	43690665
83	196	NEW YORK, N.Y./NEWARK, N.J.	RALEIGH/DURHAM, N.C.	45738	0.19	32.62	19767485
84	70	CHICAGO, ILLINOIS	HOUSTON, TEXAS	45665	0.19	32.82	63352490
85	35	CHICAGO, ILLINOIS	PHOENIX, ARIZONA	45340	0.19	33.01	67627269

1984 TOP 100

AIRPORT	TOTAL PASSENGERS	TOTAL CARGO MAIL/FREIGHT	TOTAL OPERATIONS
'Hare International Chicago, Illinois	42,873,953	816,135	667,963
artsfield Atlanta International Atlanta, Georgia	37,919,802	491,047	612,791
os Angeles International Los Angeles, California	33,426,731	877,810	506,176
ennedy International Jamaica, New York	27,904,474	1,164,272	304,322
allas/Ft. Worth Airport Dallas/Ft. Worth, Texas	26,785,852	334,546	435,490
eathrow Airport London, England	26,749,200	533,700	283,200
apleton International Denver, Colorado	25,247,105	208,762	458,088
an Francisco International San Francisco, California	23,166,500	429,202	362,846
ami International Miami, Florida	19,321,718	537,183	341,622
Guardia Flushing, New York	18,813,397	81,257	324,176
ston-Logan International Boston, Massachusetts	17,848,797	170,959	314,566
wark International Newark, New Jersey	17,411,253	200,211	268,186
ankfurt/Main Frankfurt, West Germany	17,030,197	743,743	238,009
aka International Osaka, Japan	16,363,168	276,054	123,276
ly Airport Paris, France	16,258,117	201,791	157,868
mbert-St. Louis International St. Louis, Missouri	16,241,311	80,656	361,724
nolulu International Honolulu, Hawaii	15,261,993	215,025	333,038
shington National Airport Washington, D.C.	14,166,345	61,695	334,431
ronto International Toronto, Canada	13,662,828	NA	NA
arles de Gaulle Paris, France	13,410,935	521,081	133,643
ston Intercontinental Houston, Texas	12,984,616	75,424	321,142
micino Airport Rome, Itlay	12,494,694	207,727	135,936
wick Airport London, England	12,476,800	121,600	151,800
ater Pittsburgh International Pittsburgh, Pennsylvania	11,832,371	68,766	320,763
ico City International Mexico City, Mexico	11,699,350	NA	196,543
rid-Barajas Airport Madrid, Spain	10,157,784	153,940	113,397

	AIRPORT	TOTAL PASSENGERS	TOTAL CARGO MAIL/FREIGHT	TOTAL OPERATI
27	Sea-Tac International Seattle, Washington	10,141,737	216,710	209,2
28	McCarran International Las Vegas, Nevada	10,057,479	14,697	295,3
29	Schiphol Airport Amsterdam, Netherlands	9,679,792	390,238	187,6
30	Detroit Metropolitan Wayne County Detroit, Michigan	9,606,053	103,194	282,24
31	Philadelphia International Philadelphia, Pennsylvania	9,498,104	136,559	319,29
32	Minneapolis-St. Paul International Minneapolis, Minnesota	9,075,531	120,324	307,80
33	Hong Kong International Hong Kong	8,850,308	378,435	70,25
34	Palma Airport Palma, Spain	8,735,716	24,435	77,69
35	Sky Harbor International Phoenix, Arizona	8,605,408	47,203	346,78
36	Copenhagen Airport Kastrup Copenhagen, Denmark	8,285,211	169,580	162,95
37	Zurich Airport Zurich, Switzerland	8,255,591	194,096	165,82
38	Tampa International Tampa, Florida	8,228,049	46,174	285,00
39	King Abdulaziz International Jeddah, Saudi Arabia	8,101,600	135,773	84,88
40	Orlando International Orlando, Florida	7,990,542	31,740	162,86
41	Charlotte/Douglas International Charlotte, North Carolina	7,756,166	44,891	292,82
42	Changi Airport Republic of Singapore	7,635,553	266,551	63,81
43	Duesseldorf Airport Duesseldorf, West Germany	7,136,112	35,743	103,57
44	Salt Lake City International Salt Lake City, Utah	7,059,964	65,743	269,21
45	San Diego International San Diego, California	6,547,439	29,561	142,64
46	Bombay Airport Bombay, India	6,351,567	144,712	56,86
47	Munich-Riem Airport Munich, West Germany	6,073,229	42,112	134,11
48	Linate International Milan, Italy	5,978,559	61,782	97,23
49	New Orleans International New Orleans, Louisiana	5,896,694	49,615	121,30
50	Ft. Lauderdale-Hollywood Int'l Ft. Lauderdale, Florida	5,700,618	23,881	236,28
51	Bangkok International Airport Bangkok, Thailand	5,670,268	123,614	54,47
52	Stockholm Arlanda Airport Stockholm, Sweden	5,662,977	59,831	53,21

	AIRPORT	TOTAL PASSENGERS	TOTAL CARGO MAIL/FREIGHT	TOTAL OPERATI
53	Cleveland Hopkins International Cleveland, Ohio	5,606,771	52,484	219,5
54	Aeroporto Internacional do Rio Rio de Janeiro, Brasil	5,468,533	127,698	84,5
55	Barcelona International Airport Barcelona, Spain	5,460,916	50-,920	73,4
56	Sao Paulo International Sao Paulo, Brasil	5,305,906	62,722	124,6
57	Dallas Love Field Dallas, Texas	5,269,943	NA	307,2
58	Baltimore-Washington International Baltimore-Washington	5,197,004	103,904	249,7
59	William P. Hobby Houston, Texas	5,093,725	3,424	309,9
60	Kansas City International Kansas City, Missouri	5,029,605	45,956	150,1
61	Memphis International Memphis, Tennessee	4,908,291	55,394	293,8
62	Puerto Rico International San Juan, Puerto Rico	4,877,785	137,393	172,8
63	Kimpo International Airport Seoul, Korea	4,852,739	275,850	40,9
64	Portland International Portland, Oregon	4,538,579	63,772	206,7
65	Jan Smuts Airport Johannesburg, South Africa	4,222,300	NA	92,5
66	Geneve-Cointrin Geneva, Switzerland	4,195,085	44,764	122,6
67	Tegel Airport Berlin , Germany	4,135,163	18,670	50,7
68	Hamburg International Hamburg, West Germany	4,111,178	37,583	92,3
69	Las Palmas International Las Palmas, Spain	4,110,421	31,863	37,0
70	Malaga International Airport Malaga, Spain	4,095,279	8,076	38,0
71	Chiang Kai-Shek International Taipei, Republic of China	4,076,408	265,784	34,8
72	Marseille Airport Marseille, France	4,075,740	22,488	46,2
73	Delhi Airport Delhi, India	3,911,796	101,312	43,9
74	Nice Airport Nice, France	3,820,795	12,098	87,7
75	Helsinki-Vantaa Airport Helsinki, Finland	3,820,607	40,989	84,4
76	San Antonio International San Antonio, Texas	3,781,061	7,702	169,5
77	Palm Beach International W. Palm Beach, Florida	3,729,190	6,614	220,7
78	Greater Cincinnati International Cincinnati, Ohio	3,708,958	37,761	160,0
79	Kahului Airport Kahului, Hawaii	3,664,738	20,829	124,2

	AIRPORT	TOTAL PASSENGERS	TOTAL CARGO MAIL/FREIGHT	TOTAL OPERATI
80	San Jose Municipal San Jose, California	3,550,368	15,257	345,9
81	Greater Buffalo International Buffalo, New York	3,392,019	34,722	153,5
82	Tenerife Sur Tenerife, Spain	3,239,416	14,989	26,1
83	Kemayoran Airport Jakarta, Indonesia	3,194,572	37,718	112,2
84	Guadalajara Guadalajara, Mexico	3,174,401	NA	83,9
85	Ben Gurion International Tel-Aviv, Israel	3,087,095	NA	21,9
86	Vienna Airport Vienna, Austria	3,070,527	40,750	78,5
87	Bradley International Windsor Locks, Connecticut	3,063,767	32,596	153,8
88	Port Columbus International Columbus, Ohio	3,040,779	16,495	231,9
89	Albuquerque International Albuquerque, New Mexico	2,956,886	25,678	213,5
90	Lisbon Airport Lisbon, Portugal	2,925,397	53,914	41,5
91	General Mitchell Field Milwaukee, Wisconsin	2,923,641	34,210	166,0
92	Oakland International Oakland, California	2,914,669	69,204	356,6
93	Dulles International Washington, D.C.	2,874,748	52,177	165,0
94	Burbank-Glendale-Pasadena Burbank, California	2,847,463	6,822	207,7
95	Indianapolis International Indianapolis, Indiana	2,840,686	35,102	180,6
96	Norfolk International Norfolk, Virginia	2,831,504	11,933	162,2
97	Reno Cannon International Reno, Nevada	2,794,462	6,518	145,3
98	John Wayne Airport Santa Ana, California	2,793,640	2,038	457,8
99	Kuwait International State of Kuwait	2,763,786	71,372	29,4
100	Anchorage International Anchorage, Alaska	2,616,572	144,468	65,9
101	Sacramento Metro Sacramento, California	2,587,376	11,161	118,7
102	Will Rogers World Airport Oklahoma City, Oklahoma	2,584,728	24,803	157,6
103	Tulsa International Tulsa, Oklahoma	2,564,509	18,835	218,3
104	Dublin Airport Dublin, Ireland	2,543,472	42,748	93,4
105	Dayton International Dayton, Ohio	2,511,354	293,500	148,7
106	Stuttgart Airport Stuttgart, West Germany	2,504,696	19,648	83,5

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AIR TRAFFIC STATISTICS

		DECEMBER		% CHG	CALENDAR		% CHG
		1985	1984		1985	1984	
FLIGHTS	DOMESTIC						
	AIR CARRIER	17,693	16,280	9	197,822	189,053	5
	COMMUTER AIRLINE	9,749	8,902	10	129,980	111,479	17
	TOTAL SCHEDULED	27,442	25,182	9	327,802	300,532	9
	NON-SCHEDULED	78	79	-1	1,181	700	69
	TOTAL DOMESTIC	27,520	25,261	9	328,983	301,232	9
	INTERNATIONAL						
	TRANSATLANTIC	423	373	13	6,394	5,682	13
	TRANS-BORDER	973	696	40	11,587	9,397	23
	BERMUDA/BAHAMAS	117	113	4	1,411	1,429	-1
	TOTAL SCHEDULED	1,513	1,182	28	19,392	16,508	17
	NON-SCHEDULED	23	78	-71	1,143	1,219	-6
	TOTAL INTERNATIONAL	1,536	1,260	22	20,535	17,727	16
	TOTAL FLIGHTS	29,056	26,521	10	349,518	318,959	10
PASSENGERS	DOMESTIC						
	AIR CARRIER	1,399,976	1,286,279	9	17,036,208	16,201,165	5
	COMMUTER AIRLINE	74,808	60,712	23	1,084,472	1,004,784	8
	TOTAL SCHEDULED	1,474,784	1,346,991	9	18,120,680	17,205,949	5
	NON-SCHEDULED	4,011	6,246	-36	113,986	78,049	46
	TOTAL DOMESTIC	1,478,795	1,353,237	9	18,234,666	17,283,998	6
	INTERNATIONAL						
	TRANSATLANTIC	50,939	56,208	-9	1,071,756	1,001,426	7
	TRANS-BORDER	53,531	48,025	11	719,887	710,952	1
	BERMUDA/BAHAMAS	10,653	8,838	21	207,077	208,759	-1
	TOTAL SCHEDULED	115,123	113,071	2	1,998,720	1,921,137	4
	NON-SCHEDULED	4,952	8,184	-39	215,038	212,837	1
	TOTAL INTERNATIONAL	120,075	121,255	-1	2,213,758	2,133,974	4
	TOTAL PASSENGERS	1,598,870	1,474,492	8	20,448,424	19,417,972	5
MAIL	DOMESTIC	12,780,236	12,233,297	4	109,772,010	101,648,178	8
	INTERNATIONAL	1,286,975	1,134,746	13	9,757,704	9,160,333	7
	TOTAL MAIL (LBS.)	14,067,211	13,368,043	5	119,529,714	110,808,511	8
CARGO	DOMESTIC	28,666,748	31,228,001	-8	387,458,058	416,205,678	-7
	INTERNATIONAL	12,520,418	13,144,201	-5	158,637,970	140,788,931	13
	TOTAL CARGO (LBS.)	41,187,166	44,372,202	-7	546,096,028	556,994,609	-2
	ALL OTHER OPERATIONS (1)						
	FLIGHTS	2,259	2,016	12	30,497	32,082	-5
	PASSENGERS	4,130	3,544	17	53,360	69,875	-24

NOTE: (1) INCLUDES GENERAL AVIATION, MILITARY, ETC.

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AIR TRAFFIC STATISTICS

TRAFFIC CATEGORY	DECEMBER 1984	DECEMBER 1983	% CHG	CALENDAR YEAR TO DATE 1984	CALENDAR YEAR TO DATE 1983	% CHG
DOMESTIC						
AIR CARRIER	16,280	15,154	7	189,053	175,729	8
COMMUTER AIRLINE	8,902	8,556	4	111,479	95,135	17
TOTAL SCHEDULED	25,182	23,710	6	300,532	270,864	11
NON-SCHEDULED	79	43	84	700	589	19
TOTAL DOMESTIC	25,261	23,753	6	301,232	271,453	11
INTERNATIONAL						
TRANSATLANTIC	373	348	7	5,682	5,489	4
TRANS-BORDER	696	740	-6	9,397	9,069	4
BERMUDA/BAHAMAS	113	123	-8	1,429	1,517	-6
TOTAL SCHEDULED	1,182	1,211	-2	16,508	16,075	3
NON-SCHEDULED	78	65	20	1,219	1,428	-15
TOTAL INTERNATIONAL	1,260	1,276	-1	17,727	17,503	1
TOTAL FLIGHTS	26,521	25,029	6	318,959	288,956	10
DOMESTIC						
AIR CARRIER	1,286,279	1,166,683	10	16,201,165	14,824,243	9
COMMUTER AIRLINE	80,712	64,848	-6	1,004,784	821,341	22
TOTAL SCHEDULED	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
NON-SCHEDULED	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL DOMESTIC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
INTERNATIONAL						
TRANSATLANTIC	56,208	47,581	18	1,001,426	927,073	8
TRANS-BORDER	48,025	51,624	-7	710,982	705,078	1
BERMUDA/BAHAMAS	5,089	5,939	-1	208,759	219,595	-
TOTAL SCHEDULED	111,522	[illegible]	[illegible]	1,921,167	1,851,746	[illegible]
NON-SCHEDULED	9,733	5,787	-7	211,807	282,52-	-25
TOTAL INTERNATIONAL	121,255	116,910	4	2,133,974	2,130,262	0
TOTAL PASSENGERS	1,474,492	1,353,983	9	19,417,972	17,848,797	[illegible]
DOMESTIC	12,233,297	11,156,739	10	101,648,178	94,221,328	8
INTERNATIONAL	1,134,746	1,146,688	-1	9,160,333	9,341,217	-2
TOTAL MAIL (LBS.)	13,368,043	12,303,427	9	110,808,511	103,562,545	7
DOMESTIC	31,175,001	34,646,133	-10	416,152,678	382,672,971	9
INTERNATIONAL	13,144,201	10,008,964	31	140,358,152	111,247,317	26
TOTAL CARGO (LBS.)	44,319,202	44,655,097	-1	556,510,830	493,920,288	13
ALL OTHER OPERATIONS (1)						
FLIGHTS	1,597	1,546	3	23,965	27,158	-12
PASSENGERS	2,076	2,339	-11	41,236	56,238	-27

NOTE: (1) INCLUDES GENERAL AVIATION, MILITARY, ETC.

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AIR TRAFFIC STATISTICS

	TRAFFIC CATEGORY	DECEMBER 1983	DECEMBER 1982	% CHG	CALENDAR YEAR TO DATE 1983	CALENDAR YEAR TO DATE 1982	% C
	DOMESTIC						
	AIR CARRIER	15,154	14,011	8	175,729	158,810	
	COMMUTER AIRLINE	8,556	6,741	27	95,135	69,042	
	TOTAL SCHEDULED	23,710	20,752	14	270,864	227,852	
F	NON-SCHEDULED	43	57	-25	589	629	
L	TOTAL DOMESTIC	23,753	20,809	14	271,453	228,481	
I	INTERNATIONAL						
G	TRANSATLANTIC	348	343	1	5,489	5,135	
H	TRANS-BORDER	740	707	5	9,069	8,442	
T	BERMUDA/BAHAMAS	123	122	1	1,517	1,596	
S	TOTAL SCHEDULED	1,211	1,172	3	16,075	15,173	
	NON-SCHEDULED	65	58	12	1,428	814	
	TOTAL INTERNATIONAL	1,276	1,230	4	17,503	15,987	
	TOTAL FLIGHTS	25,029	22,039	14	288,956	244,468	
	DOMESTIC						
	AIR CARRIER	1,166,683	1,097,560	6	14,824,243	13,185,121	
P	COMMUTER AIRLINE	64,848	46,212	40	821,341	652,332	
A	TOTAL SCHEDULED	1,231,531	1,143,772	8	15,645,584	13,837,453	
S	NON-SCHEDULED	5,542	7,599	-27	72,951	71,949	
S	TOTAL DOMESTIC	1,237,073	1,151,371	7	15,718,535	13,909,402	
E	INTERNATIONAL						
N	TRANSATLANTIC	47,581	47,621	0	927,073	828,180	
G	TRANS-BORDER	51,624	52,670	-2	705,070	741,565	
E	BERMUDA/BAHAMAS	8,938	8,351	7	215,595	233,888	
R	TOTAL SCHEDULED	108,143	108,642	0	1,847,738	1,803,633	
S	NON-SCHEDULED	8,767	7,044	24	282,524	154,687	
	TOTAL INTERNATIONAL	116,910	115,686	1	2,130,262	1,958,320	
	TOTAL PASSENGERS	1,353,983	1,267,057	7	17,848,797	15,867,722	
M	DOMESTIC	11,156,739	11,026,174	1	94,221,328	95,240,072	
A	INTERNATIONAL	1,146,688	1,146,379	0	9,341,217	7,719,197	
I							
L	TOTAL MAIL (LBS.)	12,303,427	12,172,553	1	103,562,545	102,959,269	
C	DOMESTIC	34,646,133	28,429,377	22	382,672,971	302,172,504	
A	INTERNATIONAL	10,008,964	8,111,902	23	111,247,317	98,018,857	
R							
G	TOTAL CARGO (LBS.)	44,655,097	36,541,279	22	493,920,288	400,191,361	
O							
	ALL OTHER OPERATIONS (1)						
	FLIGHTS	1,546	2,342	-34	27,158	30,989	-1
	PASSENGERS	2,339	8,128	-71	56,238	91,209	-3

MASSACHUSETTS PORT AUTHORITY
AVIATION DEPARTMENT
BOSTON - LOGAN INTERNATIONAL AIRPORT

AIR TRAFFIC STATISTICS

TRAFFIC CATEGORY	DECEMBER 1982	DECEMBER 1981	% CHG	CALENDAR YEAR TO DATE 1982	CALENDAR YEAR TO DATE 1981	% CHG
DOMESTIC						
AIR CARRIER	14,273	12,752	12	160,791	172,667	-7
COMMUTER AIRLINE	6,479	5,212	24	67,066	62,173	8
TOTAL SCHEDULED	20,752	17,964	16	227,857	234,840	-3
NON-SCHEDULED	57	8	613	628	246	155
TOTAL DOMESTIC	20,809	17,972	16	228,485	235,086	-3
INTERNATIONAL						
TRANSATLANTIC	343	304	13	5,135	5,236	-2
TRANS-BORDER	707	626	13	8,442	8,654	-2
BERMUDA/BAHAMAS	402	149	170	1,876	2,184	-14
TOTAL SCHEDULED	1,452	1,079	35	15,453	16,074	-4
NON-SCHEDULED	58	22	164	810	633	28
TOTAL INTERNATIONAL	1,510	1,101	37	16,263	16,707	-3
TOTAL FLIGHTS	22,319	19,073	17	244,748	251,793	-3
DOMESTIC						
AIR CARRIER	1,101,245	995,991	11	13,219,566	12,296,493	8
COMMUTER AIRLINE	42,527	38,416	11	618,469	494,496	25
TOTAL SCHEDULED	1,143,772	1,034,407	11	13,838,035	12,790,989	8
NON-SCHEDULED	7,599	936	712	71,793	20,008	259
TOTAL DOMESTIC	1,151,371	1,035,343	11	13,909,828	12,810,997	9
INTERNATIONAL						
TRANSATLANTIC	47,621	41,035	16	828,180	834,952	-1
TRANS-BORDER	52,670	52,393	1	741,565	740,336	0
BERMUDA/BAHAMAS	8,351	14,917	-44	233,888	321,360	-27
TOTAL SCHEDULED	108,642	108,345	0	1,803,633	1,896,648	-5
NON-SCHEDULED	7,044	4,017	75	154,261	119,845	29
TOTAL INTERNATIONAL	115,686	112,362	3	1,957,894	2,016,493	-3
TOTAL PASSENGERS	1,267,057	1,147,705	10	15,867,722	14,827,490	7
DOMESTIC	11,026,174	10,726,282	3	95,240,072	98,722,666	-4
INTERNATIONAL	1,146,379	1,011,990	13	7,719,197	10,482,365	-26
TOTAL MAIL (LBS.)	12,172,553	11,738,272	4	102,959,269	109,205,031	-6
DOMESTIC	28,429,377	24,385,839	17	302,172,504	295,809,580	2
INTERNATIONAL	8,111,902	7,163,759	13	98,018,857	92,617,393	6
TOTAL CARGO (LBS.)	36,541,279	31,549,598	16	400,191,361	388,426,973	3
ALL OTHER OPERATIONS (1)						
FLIGHTS	2,342	2,914	-20	30,989	32,133	-4
PASSENGERS	8,128	11,041	-26	91,209	113,371	-20

NOTE: (1) INCLUDES GENERAL AVIATION, MILITARY, ETC.

Massachusetts Port Authority
Aviation Department
Boston — Logan International Airport

AIR TRAFFIC STATISTICS

TRAFFIC CATEGORY	DECEMBER 1981	DECEMBER 1980	% Chg.	YEAR TO DATE 1981	YEAR TO DATE 1980	% Chg.
DOMESTIC						
Air Carrier	12,439	14,178	-12	169,354	177,953	- 5
Commuter Airline	5,556	4,518	23	65,564	60,623	8
Total Scheduled	17,995	18,696	- 4	234,918	238,576	- 2
Non-Scheduled	1	157	-99	239	733	- 67
TOTAL DOMESTIC	17,996	18,853	- 5	235,157	239,309	- 2
INTERNATIONAL						
Transatlantic	351	401	-12	5,341	6,916	- 23
Trans-Border	626	684	- 8	8,654	9,105	- 5
Bermuda/Bahamas	140	187	-25	2,169	2,226	- 3
Total Scheduled	1,117	1,272	-12	16,164	18,247	- 11
Non-Scheduled	29	27	7	640	611	5
TOTAL INTERNATIONAL	1,146	1,299	-12	16,804	18,858	- 11
TOTAL FLIGHTS	19,142	20,152	- 5	251,961	258,167	- 2
DOMESTIC						
Air Carrier	985,574	941,485	5	12,208,613	12,090,835	1
Commuter Airline	48,833	34,474	42	582,568	467,903	25
Total Scheduled	1,034,407	975,959	6	12,791,181	12,558,738	2
Non-Scheduled	18	213	-92	19,090	5,019	280
TOTAL DOMESTIC	1,034,425	976,172	6	12,810,271	12,563,757	2
INTERNATIONAL						
Transatlantic	42,752	51,953	-18	838,123	966,437	- 13
Trans-Border	52,393	54,488	- 4	740,336	736,377	1
Bermuda/Bahamas	13,200	25,264	-48	318,191	377,785	- 16
Total Scheduled	108,345	131,705	-18	1,896,650	2,080,599	- 9
Non-Scheduled	4,935	3,502	41	120,763	78,007	55
TOTAL INTERNATIONAL	113,280	135,207	-16	2,017,413	2,158,606	- 7
TOTAL PASSENGERS	1,147,705	1,111,379	3	14,827,684	14,722,363	1
DOMESTIC	10,701,813	11,162,511	- 4	98,169,773	98,083,094	0
INTERNATIONAL	1,011,990	1,384,504	-27	10,482,367	11,897,083	- 12
TOTAL MAIL (lbs.)	11,713,803	12,547,015	- 7	108,652,140	109,980,177	- 1
DOMESTIC	24,077,774	25,675,669	- 6	296,068,532	295,310,586	0
INTERNATIONAL	7,163,760	7,152,402	0	92,633,156	101,207,984	- 8
TOTAL CARGO (lbs.)	31,241,534	32,828,071	- 5	388,701,688	396,518,570	- 2
ALL OTHER OPERATIONS[1]						
Flights	2,914	2,607	12%	32,133	38,684	-17%
Passengers	11,041	11,473	-4%	112,927	128,062	-12%

Table VI-15

AIR TRAVEL PASSENGERS ARRIVING
AND DEPARTING LOGAN AIRPORT

Year	Number	
	Total	International
1960	2,939,344	139,078
1970	9,392,625	916,406
1975	10,515,390	1,386,011
1976	11,395,537	1,514,722
1977	12,119,811	1,635,011
1978	13,543,062	1,837,636
	Annual Rate of Growth (In Percent)	
1960-78	8.9	15.4
1970-78	4.7	9.1
1975-78	8.8	9.9
1977-78	11.7	12.4

Source: Massport, February 9, 1979

International Air Freight Study
for
Logan International Airport

Summary of Project Findings

Data Resources has completed a study of air freight moving through Logan Airport for Massport. The study addressed four major questions:

(1) What is Logan's rank relative to other U.S. airports?
(2) Which countries are Logan's principal trading partners?
(3) What commodities move between Logan and the major trading partners?
(4) How has Logan's share of U.S. airborne trade changed over time?

The study used 1983 as the base year for the analysis of the first three questions and the quarterly trend from 1981 through 1983 for the last. The major results are presented below. For more detail about the study methodology, source data, or product nomenclature, please consult the full final report.

I. Logan's Rank Among U.S. Airports

Logan Airport ranks sixth among U.S. gateways studied, after New York, Los Angeles, San Francisco, Chicago, and Miami. International commerce is dominated by these six airports which account for approximately 90% of total imports and exports, whether measured by value or volume.

However, Logan's share of total exports (4.8% based on value, 3.8% based on volume) significantly outstrips the airport's share of total imports (2.6% based on value, 2.9% based on volume). The total value of exports from Logan ($2,074 million) is more than twice the value of imports unloaded ($937 million). Volume data are much closer, with exports of 67.7 million lbs. and imports of 62.6 million lbs.

	IMPORTS				EXPORTS			
	$	%	lbs	%	$	%	lbs	%
New York	18,836	52.3	957	44.9	17,887	41.1	604	33.8
Los Angeles	4,904	13.6	282	13.2	8,203	18.9	252	14.1
San Francisco	4,747	13.2	149	7.0	4,512	10.4	104	5.8
Chicago	2,708	7.5	192	9.0	4,612	10.6	198	11.1
Miami	1,167	3.2	299	14.0	2,627	6.0	327	18.3
Boston	937	2.6	63	2.9	2,074	4.8	68	3.8
All Others	2,688	7.4	189	8.9	3,592	8.2	234	13.1
U.S. Total	35,986	100.0	2131	100.0	43,508	100.0	1787	100.0

NOTE: Value figures in millions of dollars, volume in millions of pounds.

II. Logan's Principal Trading Partners

IIA. Regional Trade Patterns - Exports

The following table summarizes the regional distribution of exports for the U.S. gateways as a whole and contrasts the position of Logan.

Value of Exports by Region - 1983
(millions of dollars)

	U.S. Total		Logan Airport		
	$	%	$	%	% of US
Europe	20,217	46.5%	1,764	85.03%	8.73%
Asia	12,360	28.4	86	4.13	0.69
North America	3,716	8.5	155	7.46	4.16
South America	2,480	5.7	1	0.05	0.04
Middle East	2,296	5.3	41	2.01	1.82
Australia/Oceania	1,408	3.2	5	0.26	0.39
Africa	1,030	2.4	22	1.06	2.14
TOTAL	43,508	100.0%	2,075	100.00%	4.77%

While for the U.S. as a whole, exports to Europe accounted for less than half of total exports, over 85% of Logan's exports were Europe-bound. And while Logan ranked sixth overall, capturing only 4.77% of total exports, it was fourth in exports to Europe with almost 9% of the total.

Conversely, trade with Asia, which represented almost one third of U.S. exports represented only 4% of Logan's trade.

The table below makes the same comparisons based on volume data. Once again, trade with Europe accounted for the lion's share of exports (80%), making Logan the fourth largest airport exporting to Europe.

Volume of Exports by Region - 1983
(millions of pounds)

	U.S. Total		Logan Airport		
	lbs.	%	lbs.	%	% of US
Europe	705.7	39.5%	54.3	80.15%	7.70%
Asia	372.0	20.8	2.1	3.06	0.56
North America	264.0	14.8	8.2	12.10	3.11
South America	237.5	13.3	0.02	0.02	0.01
Middle East	104.9	5.9	2.03	3.00	1.94
Australia/Oceania	56.7	3.2	0.25	0.36	0.44
Africa	45.9	2.6	0.88	1.30	1.92
TOTAL	1,786.8	100.0%	67.8	100.00%	3.79%

IIB. Regional Trade Patterns - Imports

As with exports, Logan's imports were concentrated on trade with Europe. For the U.S. as a whole, the value of imports from Europe and from Asia was roughly the same (40.0% and 41.9% respectively). However, in the case of Logan, imports from Europe accounted for almost 80% of the total. Once again, Logan ranked fourth among import gateways, compared to its overall ranking of number six. The tables below contrast Logan's regional distribution of imports with the U.S. as a whole.

Value of Imports by Region - 1983
(millions of dollars)

	U.S. Total		Logan Airport		
	$	%	$	%	% of US
Europe	14,410	40.0%	738	78.80%	5.12%
Asia	15,066	41.9	74	7.93	0.49
North America	2,576	7.2	91	9.68	3.52
South America	1,662	4.6	11	1.22	0.69
Middle East	1,099	3.1	17	1.83	1.85
Australia/Oceania	928	2.6	1	0.12	0.48
Africa	245	0.6	4	0.40	0.34
TOTAL	43,508	100.0%	2,075	100.00%	4.77%

The picture based on volume data is very similar. Once again, trade with Europe accounted for the lion's share of imports (86%), making Logan the fourth largest airport receiving imports from Europe.

Volume of Imports by Region - 1983
(millions of pounds)

	U.S. Total		Logan Airport		
	lbs.	%	lbs.	%	% of US
Europe	841.5	39.5%	53.5	85.56%	6.36%
Asia	805.9	37.8	3.7	5.80	0.45
South America	268.9	12.6	1.2	1.88	0.44
North America	163.2	7.7	3.0	4.75	1.82
Australia/Oceania	28.2	1.3	0.1	0.20	0.44
Middle East	15.9	0.7	1.0	1.67	6.56
Africa	8.1	0.3	0.1	0.15	1.15
TOTAL	2,131.7	100.0%	62.6	100.00%	2.93%

IIC. Country Detail - Exports

Logan's export trade was concentrated among a handful of partners. Six countries (five of them European plus Canada) accounted for 82.2% of the value of Logan's exports, 77.1% of the volume. The United Kingdom was Logan's chief export trading partner, receiving more than a fourth of Logan's exports, in both value and volume terms.

Logan's Exports by Country - 1983

	Value (000's of $)		Volume (000's of lbs.)	
	$	% of total	$	% of total
United Kingdom	557,563	26.9%	18,293	27.0%
Germany	302,877	14.6	9,264	13.7
France	295,630	14.2	6,853	10.1
Ireland	294,894	14.2	10,103	14.9
Canada	143,140	6.9	4,752	7.0
Switzerland	111,643	5.4	3,008	4.4
All Others	369,230	17.8	15,506	22.9
TOTAL	2,074,977	100.0%	67,779	100.0%

It is interesting to note that Bermuda (which was not even among the groups oftrading partners which account for 90% of Logan's exports based on value) actually ranked sixth (after Canada but before Switzerland) when exports were measured in volume terms, with a total of 4,752 thousand lbs. or 5% of the total.

IID. Country Detail - Imports

Imports into Logan were also heavily concentrated among a handful of European nations plus Canada. However, the degree of concentration was somewhat less than in the case of exports.

With one exception, Logan's top six export destinations were also the chief sources of imports. However, Ireland, which ranked fourth in export value, dropped to eighth place among importers, while Italy, which ranked ninth among the export countries, moved to third place among the importers.

Logan's Imports by Country - 1983

	Value (000's of $)		Volume (000's of lbs.)	
	$	% of total	$	% of total
United Kingdom	158,584	16.93%	11,922	19.05%
Germany	152,524	16.28	11,218	17.93
Italy	106,063	11.32	7,335	11.72
Canada	86,489	9.23	2,785	4.45
Switzerland	85,559	9.13	3,152	5.04
France	78,041	8.33	5,915	9.45
All Others	269,706	28.78	20,251	32.36
TOTAL	936,966	100.00%	62,578	100.00%

Trade with the chief importing nations was more dispersed across countries than was the case with exports. Once again, the United Kingdom was Logan's chief trading partner for imports (17% of total value), but it accounted for a smaller percentage of the total than in the case of exports (27%). Germany came a close second, taking 16% of Logan's imports in value terms, 18% when measured by volume.

III. Commodity Trade with Principal Partners

IIIA. Exports - Commodity Detail

Almost half (47.5%) of all exports to Logan's chief trading partners and two fifths (39.1%) of Logan's total exports were in End Use category 2130 - Electronic Computers, Parts, and Peripherals. Computers represented the number one export to all six of Logan's major trading partners.

For each of the six major partners, roughly a dozen commodities accounted for more than 90% of Logan's exports. The table below presents the eight commodities which represent almost 80% of Logan's trade with its major partners and more than 60% of its trade worldwide.

Logan Airport - 1983
Distribution of Exports by Commodity
Top 6 U.S. Trading Partners
(Thousands of U.S. dollars)

	UK	GY	FR	IREL	CAN	SZ	TOTAL	(1) % of total 6 countries	(2) % of total all countries
1224 Precious Metals	57153	0	0	0	3843	2930	63926	3.7	3.1
2001 Communic Equip	26834	17394	13433	0	13890	7772	79323	4.7	3.8
2002 Telephone Apparat	28070	14262	7162	0	7369	2621	59484	3.5	2.9
2114 Other Machinery	19488	14093	10386	0	2426	2598	48991	2.9	2.4
2116 Measuring Instr	56504	42014	28735	0	13986	14777	156016	9.1	7.5
2130 Electr Computers	229878	145556	120122	248768	35881	30290	810495	47.5	39.1
2201 Aircrft/Eng Parts	14512	3062	0	0	14154	7665	39393	2.3	1.9
2202 Aircraft Engines	0	0	54923	0	0	16343	71266	4.2	3.4
Exports of Above Goods	432439	236381	234761	248768	91549	84996	1328894	77.9	64.0
Total Exports	557563	302877	295630	294894	143140	111643	1705747		
Top Commodities as % of Total Exports	77.6	78.0	79.4	84.4	64.0	76.1	77.9		

(1) Total exports of this commodity divided by the value of total exports to the top six trading partners

(2) Total exports of this commodity divided by the value of total exports leaving Logan

IIIB. Imports - Commodity Detail

Logan's imports were far more diverse than its exports and only one product category (2000 - Electrical Machinery) represented more than 10% of trade with the six major partners (9% of world imports). While the product groups do vary, they are concentrated around various types of machinery and scientific equipment. The thirteen commodity groups presented below account for more than three fourths of Logan's imports from its major trading partners and over half of its total imports.

Logan Airport - 1983
Distribution of Imports by Commodity
Top 6 U.S. Trading Partners
(Thousands of U.S. Dollars)

	UK	GY	IT	CA	SZ	FR	TOTAL	(1) % of total 6 countries	(2) % of total all countries
1431 Platinum metals	0	1645	0	34445	0	0	36090	5.4	3.9
2000 Elect Mach	11089	27722	6206	13280	18953	6433	83683	12.5	8.9
2011 Indus Mach	4460	13257	3282	0	2602	1132	24733	3.7	2.6
2012 Other Nonel Mach	10664	11171	5834	0	5537	8490	41696	6.2	4.5
2016 Business Mach	11762	18442	11629	2027	7456	13500	64816	9.7	6.9
2017 Med Equip	8016	16530	0	1334	4185	1797	31862	4.8	3.4
2018 Scient Instr	13274	10874	3044	0	7546	2681	37419	5.6	4.0
2101 Aircraft Parts	6264	0	0	9055	0	880	16199	2.4	1.7
4010 Leather Goods	0	1661	20450	0	0	0	22111	3.3	2.4
4012 Pharm Preps	3722	0	3184	2108	10409	1459	20882	3.1	2.2
4106 Optical & Photo	3032	3116	0	1428	0	6453	14029	2.1	1.5
4109 Other Hardgoods	16636	3537	23287	0	6161	6442	56063	8.4	6.0
5002 US Goods Ret	18446	15090	1810	11112	6691	6947	60096	9.0	6.4
Imports of Above Goods	107365	123045	78726	74789	69540	56214	509679	76.4	54.4
Total Imports	158584	152524	106063	86489	85559	78041	667260		
Top Commodities as % of Total Imports	67.7	80.7	74.2	86.5	81.3	72.0	76.4		

(1) Total trade for this commodity divided by value of total imports from the top six trading partners
(2) Total trade for this commodity divided by value of total imports entering Logan

LOGAN GROUND ACCESS IMPROVEMENTS STUDY, 1985

TECHNICAL MEMORANDUM #1

EXISTING (1984) CONDITIONS: USER CHARACTERISTICS AND TRAVEL BEHAVIOR

SUMMARY OF LOGAN AIRPORT GROUND ACCESS TRAVEL PATTERNS

- Logan Airport generated a total of 81,000 person trips in and out of the airport on an average weekday in 1984, up 39% from 1979.
- Passengers accounted for 47,000 of these trips (58%) and employees 34,000 (42%). Of the employee trips, 20,000 were commute trips and 14,000 midday trips off the airport.
- Mode use remained fairly constant from 1979 to 1984, with private autos accounting for 56,000 commute and passenger trips (69%) in 1984. Of the total private auto trips, commuting employees generated 18,000 (32%) and passengers 26,000 (46%).
- MBTA riders accounted for only 5000 person trips, of which 4400 were made by passengers and commuting employees. Of these, passengers accounted for 2600 (58%) and employees 1800 (42%).
- Origin zones within Route 128 accounted for 21,000 passenger trips (46%) and 14,000 employee commute trips (67%) in 1984. Zones outside Eastern Massachusetts accounted for 10,000 daily passenger trips (20%) and 2000 employee trips (10%).
- The North Shore (Zone 2) generated the most private auto trips -- 11,000 per day, or 23% of total private auto trips. Of these, 8,000 (81%) were made by employees. Downtown Boston and the North Shore (Zones 1 and 2) generated 56% of all MBTA trips.

TABLE 1
SUMMARY OF LOGAN AIRPORT GROUND ACCESS PERSON TRIPS
BY MAJOR MARKET GROUP
AVERAGE WEEKDAY: 1979 AND 1984

Type	Person Trips In 1979	Person Trips In 1984	Person Trips Out 1979	Person Trips Out 1984	Total Person Trips 1979	% Total	1984	% Total	% Change
Employee:									
Commute	8354	10205	8354	10205	16708	28.60	20410	25.14	22.15
Midday	3589	6965	3589	6965	7178	12.28	13930	17.15	94.06
Passenger	17264	23421	17264	23421	34528	59.10	46842	57.69	35.66
TOTAL	29207	40591	29207	40591	58414	100.00	81182	100.00	38.97
"Companion"	5682	NA	5682	NA	11364				
TOTAL	34889		34889		69778				

Source: Logan Passenger and Employee Surveys, CSI, 1979 and 1984
Central Transportation Planning Staff

Note: In 1979, the data were categorized to include a category of "passenger companions" which was not tabulated in 1984. This group included only those who accompanied a passenger to the airport and did not park at the airport, and thus the numbers there do not affect the total passenger figures.

TABLE 2
SUMMARY OF LOGAN AIRPORT PASSENGER AND EMPLOYEE
GROUND ACCESS PERSON TRIPS TO AND FROM LOGAN AIRPORT BY MODE
AVERAGE WEEKDAY: 1979 AND 1984

	EMPLOYEE COMMUTE TRIPS				EMPLOYEE MIDDAY TRIPS				PASSENGER TRIPS				TOTAL PERSON TRIPS			
	1979		1984		1979		1984		1979		1984		1979		1984	
ODE	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
A	1230	7.36	1834	8.98	198	2.75	562	4.03	2380	6.89	2572	5.49	3808	6.5	4968	6.11
ERBUS	28	0.16	36	0.17	0	0.00	0	0.00	1078	3.12	2012	4.29	1106	1.8	2048	2.52
D	0	0.00	32	0.15	22	0.30	0	0.00	1712	4.95	2316	4.94	1734	2.9	2348	2.89
I	30	0.17	134	0.65	6	0.08	28	0.20	6824	19.76	8190	17.48	6860	11.7	8352	10.28
TCAR	0	0.00	0	0.00	0	0.00	0	0.00	3994	11.56	5784	12.34	3994	6.8	5784	7.12
VCAR	14908	89.23	17882	87.61	6124	85.31	11960	85.82	18540	53.69	25968	55.43	39572	67.7	55810	68.74
ER	510	3.05	492	2.41	828	11.53	1386	9.94	0	0.00	0	0.00	1338	2.2	1878	2.31
AL	16706	100.00	20410	100.00	7178	100.00	13936	100.00	34528	100.00	46842	0.00	58412	100.0	81188	100.00

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TABLE 1

INVENTORY OF PARKING FACILITIES

LOGAN INTERNATIONAL AIRPORT

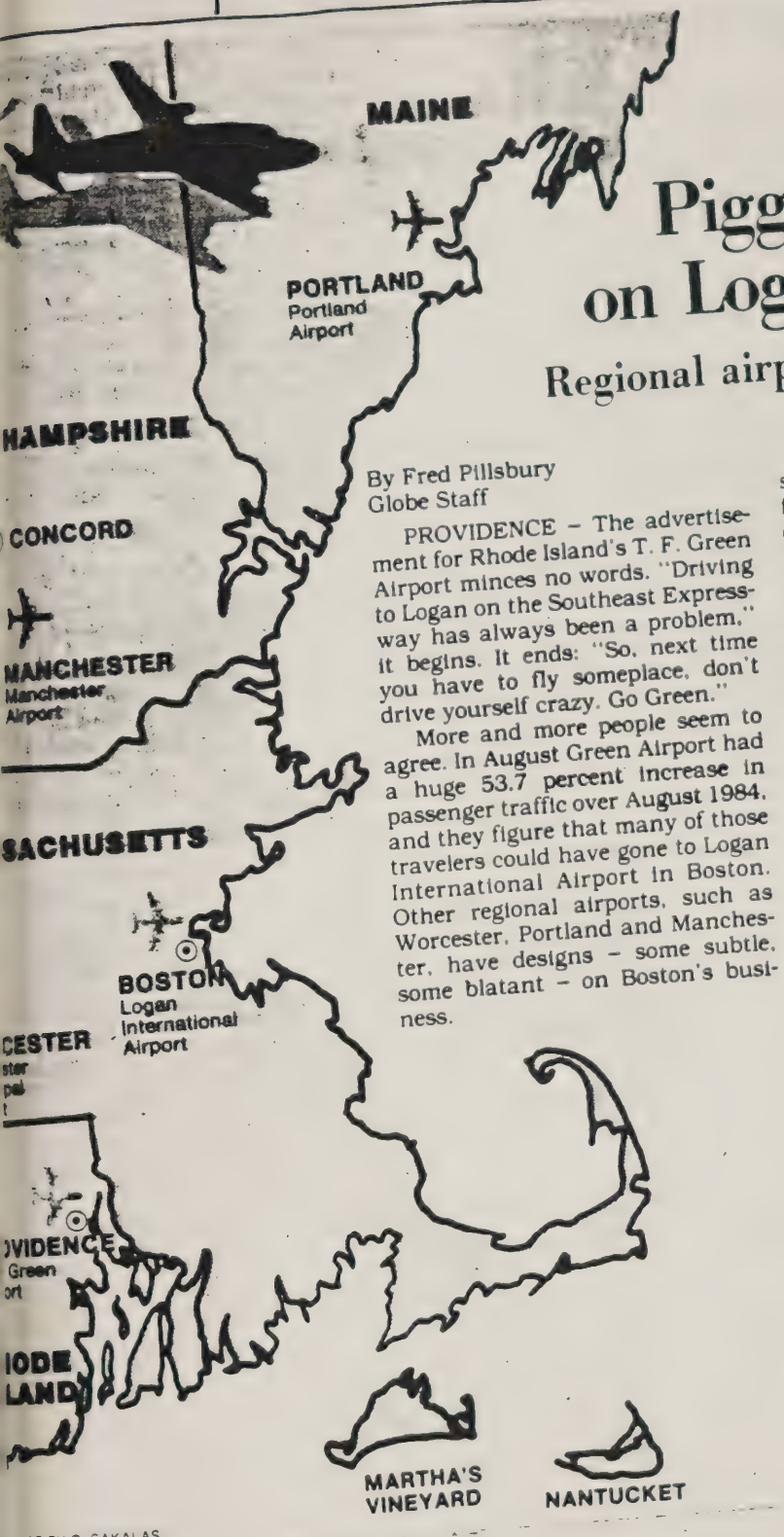
MAY 1980

SUMMARY

CODE NO.	PRIMARY CLASSIFICATION	CAPACITY	FROZEN SPACES
100	- Public Revenue Lots and Garages	9532 ←	10,400
200	- Airline Support Services	256	
300	- Taxi - Bus - Limosine	280	
400	- Airport Administration	2159	
500	- Passenger Services	1902	
600	- Air Cargo	1012	
700	- Fixed Base Operations	573	
800	- Car Rentals	2611	
	TOTAL	18,325	
900	- Off Airport Facilities	3,289	
	GRAND TOTAL	20,614	

TOTAL — 1,170,362
ITH — 1,063,600
THWEST — 206,348
DE — 569,416
3,009,726

10/6/85



MAP BY G. SAKALAS

Piggybacking on Logan's success

Regional airports prospering, too

By Fred Pillsbury
Globe Staff

PROVIDENCE – The advertisement for Rhode Island's T. F. Green Airport minces no words. "Driving to Logan on the Southeast Expressway has always been a problem," it begins. It ends: "So, next time you have to fly someplace, don't drive yourself crazy. Go Green."

More and more people seem to agree. In August Green Airport had a huge 53.7 percent increase in passenger traffic over August 1984, and they figure that many of those travelers could have gone to Logan International Airport in Boston. Other regional airports, such as Worcester, Portland and Manchester, have designs – some subtle, some blatant – on Boston's business.

Critics of airline deregulation said airports like these would suffer from its effects, and at first they did, as airlines deserted them for the more lucrative routes between the big cities. Today, though, as Logan and other major airports fill up, the regionals are beginning to prosper as the airlines rediscover them.

But the **Massachusetts Port** Authority, which operates Logan, isn't complaining at all about their new competition.

"I feel good about passengers using other airports," Massport executive director David W. Davis said, "because it's good for the passengers. It's ridiculous for a Worcesterite to have to drive to Boston to fly to New York. It's hard on the Worcesterite and incidentally congests our central city traffic."

Davis is sensitive to the feelings of operators of regional airports who don't like their facilities to be thought of as mere recipients of Logan's surplus. "Somebody has done Worcester and other airports a disservice by using the word 'reliever,'" he said.

But the fact is that too many people are driving too many cars to Logan, which five times since last Thanksgiving ran out of parking space. At a recent New England Aero Club forum Davis warned about the "imminent crisis in ground access" at the airport.

AIRPORTS, Page 36

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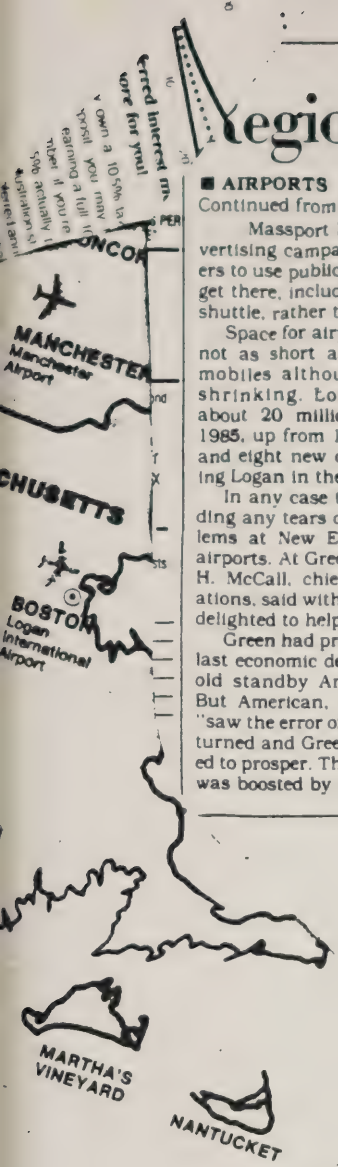
Regional airports filling in as Logan 'reliever'



■ AIRPORTS
Continued from Page 29

Massport has put on an advertising campaign urging travelers to use public transportation to get there, including its new water shuttle, rather than driving.

Space for airplanes at Logan is not as short as space for automobiles although that, too, is shrinking. Logan will handle about 20 million passengers in 1985, up from 11 million in 1975 and eight new carriers began using Logan in the past year.

In any case they are not shedding any tears over Logan's problems at New England's regional airports. At Green Airport, Walter H. McCall, chief of airport operations, said with a smile, "We'd be delighted to help them out."

Green had problems during the last economic decline, even losing old standby American Airlines. But American, as McCall put it, "saw the error of its ways" and returned and Green has since started to prosper. The August increase was boosted by the arrival of People Express and some busy charter flights to the Azores. Green is now served regularly by six major jet airlines and three commuters.

> Massport, while not exactly trying to drive away business, is eager to see the regionals develop and has, in fact, been helping Worcester with its plans.

Marketing chief Mary P. Brennan said Green is drawing many passengers from Cape Cod and communities west of Route 128 and that there was a 30 percent increase in Massachusetts automobiles in the parking lot at the time of the last survey. Green is in Warwick, about an hour from routes 128 and 95, 12 minutes from downtown Providence.

Worcester gets Piedmont

But popularity doesn't come cheap. McCall said there isn't much space left for new airlines and that a multi-level parking garage will have to be built soon.

Worcester Municipal Airport has a different story to tell. Soon after airline deregulation became a reality in 1978, Delta Air Lines, Worcester's only jet carrier, pulled out. Until last spring Worcester was served only by Bar Harbor Airlines, a commuter with service to New York.

Then, after a strong community effort to bring them in, Piedmont Airlines began service last June with two round-trips a day to its Baltimore hub, with connections south and west, and Worcester began to move again. Empire Airlines, an upper New York state carrier, was scheduled to begin Worcester-New York service Dec. 1, but last Wednesday Piedmont agreed to acquire Empire and plans are now "a bit uncertain," as an Empire spokeswoman put it.

Despite the uncertainty about Empire, Worcester airport manager Robert J. Trainor says that "everything is falling into place" and that Worcester is on its way. Piedmont is carrying good loads and conversations with several other airlines are proceeding. "We'd love to have flights to Chicago," Trainor said.

But Worcester also faces growing pains. The homey, colonial-style terminal, built in 1953, will have to be expanded if another airline comes in and so will the parking. But the market seems assured. Joel Cohen, a local businessman who is chairman of the airport commission, says there are more than 1 million people within a 15-mile radius of the airport, "a larger draw than any other area in New England." But he admits that, despite the hassle of getting there, Logan is a habit for many people.

Manchester and Portland

Two other regional airports, Manchester, N.H. and Portland, have grown in recent years and appear to have promising futures. Manchester now has four carriers, United Airlines, which flies to Chicago by way of Providence, and three commuters. It is building an addition to its terminal in anticipation of getting more.

Manchester Airport manager Richard A. Crosman said where the airlines go is crucial to Manchester's development. "A lot of people in southern New Hampshire commute to Boston," he said. "Manchester would be more convenient, but we have to develop a route structure."

At Portland airport manager Thomas F. Valleau said, "Historically, a substantial number of people from here have driven to Logan for a long-haul flight partly because of the high cost of the Portland-Boston trip segment."

But things are changing at Portland. In 1982 Portland boarded 250,000 passengers and this year the number will be up to 600,000. Valleau said much of the increase is due to People Express' low-cost flights to Newark, which complement Delta's and United's full-fare flights south and west.

"Nevertheless," he said, "I still believe that a substantial number of people are still driving to Logan from Portland and other northern New England markets."

Nobody, of course, expects the regional airports to take over from Logan. None can match Logan's diversity of airlines and flights. If you want to fly to Europe and go coast-to-coast nonstop or have your choice of New England points you will still have to "drive yourself crazy" and go to Logan.

In the meantime Massport, while not exactly trying to drive away business, is eager to see the regionals develop and has, in fact, been helping Worcester with its plans.

"I know this airport adminis-

Massachusetts Port Authority

As its name implies MassPort has traditionally served the City of Boston and the Commonwealth of Massachusetts by constructing, maintaining and operating Logan Airport and several seaport facilities. The Tobin Bridge is also owned and operated by MassPort. However, in addition to MassPort's more traditional transportation-related infrastructure, the Authority has also begun to provide the infrastructure necessary for several large-scale, mixed-use developments on various piers and waterfront properties.

In recent years, MassPort has consistently been able to generate a level of revenues from fees, rent, and investment returns which exceed it operating expenditures. This operating surplus has provided MassPort with both current funds and revenue bonding capacity with which to expand and maintain its facilities. As shown in Table 32, MassPort's infrastructure expenditures in Boston between fiscal 1978 and 1983 exceeded $272 million. An additional $95 million in capital investment is underway or planned for fiscal 1984 and 1985. The majority of Massport's previous and planned capital investment from 1978-1985 is in Logan Airport, but substantial amounts have also been budgeted for the Tobin Bridge, the marine terminals and several development sites.

Several ongoing projects, such as the construction of the MassPort Marine Terminal, the renovation of Terminal C at Logan and varied developments at Bird Island Flats, Fish Pier and Commonwealth Pier are expected to dominate MassPort's capital investment in the near future. In the intermediate term, expansion of the air facilities at Hanscom Field in Bedford and private development of MassPort's East Boston Piers

Table 32

SUMMARY OF MASSACHUSETTS PORT AUTHORITY CAPITAL INVESTMENTS, 1979-83;
FUTURE PLANS 1984-85
($000s)

	Neighborhood(s)	Past Investments 1978	1979	1980	1981	1982	1983	Future Plans 1984-1985
Tobin Bridge		38	158	2,382	5,001	2,503	2,475	6,218
Maritime								
Moran Terminal	Charlestown	1,000	81	873	2,613	2,224	113	1,495
Mystic Pier	Charlestown	12	29	275	852	2	134	12
Castle Island/Conley Terminal	South Boston	331	88	2,945	17,598	14,050	927	5,525
E. Boston Pier	East Boston	0	0	28	88	0	39	0
Army Base	South Boston	0	0	0	0	26	506	100
Little Mystic Channel Bridge	Charlestown	0	81	165	201	213	19	0
Marine Terminal at BMIP	South Boston	0	0	505	9,037	13,118	1,820	2,588
Unallocated Equipment		0	1,359	3,283	386	99	485	1,740
Miscellaneous Capital Expenditures		0	10	143	0	0	0	0
Total Maritime		1,343	1,708	8,217	30,775	29,732	4,043	11,480
Infrastructure Investments for Development Projects								
Building Investments	South Boston	81	525	277	273	1,768	581	1,221
Pier Investments	South Boston, Charlestown	4,000	274	1,837	2,481	3,347	6,956	12,314
Bird Island Flats Infrastructure Investments	East Boston	0	0	95	1,072	4,111	4,181	5,343
Other Development Infrastructure Investment	South Boston	184	655	798	1,542	1,448	654	9,742
Total Development Investments		4,265	1,454	3,007	5,368	10,674	12,372	28,620
Logan Airport								
Airfield	East Boston	8,269	3,094	9,279	7,324	5,713	5,493	1,550
Terminals	East Boston	56,427	2,464	2,596	551	131	1,871	15,544
Buildings	East Boston	7,942	94	205	841	897	79	350
Water, Sewer, and Utilities	East Boston	663	60	903	376	1,241	1,157	4,919
Ground Transportation and Parking	East Boston	0	46	122	175	1,301	377	6,294
Unallocated Completed Facilities	East Boston	0	0	0	0	6,011	0	0
Noise Management	East Boston	88	596	1,326	1,761	1,325	141	3,680
Miscellaneous Expenditures/General Equipment Purchases	East Boston	3,341	325	970	473	913	1,332	8,465
Physical Planning/Environmental Studies	East Boston	0	0	172	768	66	5	690
Bird Is. Fl. Cargo Facilities Investments	East Boston	0	518	565	0	2,342	2,508	7,000
Total Logan Airport Investments		76,730	7,197	2,138	12,269	19,940	12,963	48,492
General Reserves		125	3	7	0	598	56	424
Total Capital Investments by MassPort		83,265	11,392	31,319	54,884	64,053	34,222	95,234

Funding Analysis: ($000s)

1978-83 Approximately 217,000 or 87% was derived from MassPort internal revenues or revenue bonds. The remaining 35,520 or 13% was obtained from government grants.

1984-85 Approximately 81,000 or 85% will come from Massport revenues and revenue bonds. The remaining 14,000 is expected to come from outside grants.

Sources: MassPort to 1985 as BRA Infrastructure Survey Questionnaire, also MassPort Annual Reports 1978-83

will also become priority projects. Over the longer term, MassPort's capital spending will be shaped by the need to integrate the northern terminus of the Third Harbor Crossing into Logan Airport's internal roadway system and by investments needed to complete the MassPort Marine Terminal. These two projects are likely to require $150-200 million in the late 1980s and the 1990s. The following provides a slightly more detailed discussion of MassPort's recent capital investment record and future plans.

MassPort's Tobin Bridge is an important access route for Boston commuters and trucked goods. Each year the bridge conveys approximately 25 million vehicles between Boston and Chelsea. Since 1979 toll revenues from Tobin Bridge have hovered between $5.5 and 6.0 million/year. These revenues have been more than sufficient to pay for the $12.5 million in capital improvements to the bridge made between 1979 and 1983. Another $6.2 million in capital improvements and maintenance for the bridge is budgeted for 1984 and 1985. This steady stream of investment, supported at least indirectly by the bridge's toll revenues, has kept Tobin Bridge in generally good condition.

MassPort's maritime facilities include several marine cargo terminals collectively known as the Port of Boston, as well as various fishing piers and waterfront development sites. The Port of Boston consists of the Conley Terminal in South Boston, the Moran Terminal in Charlestown and another terminal presently under construction on land leased from EDIC at the Boston Marine Industrial Park. Table 32 shows the investment record and current investment plans at these marine cargo terminals. In addition to the ongoing construction of the new Massport Marine Terminal at BMIP nearly $8 million have been spent for the

modernization of Moran Terminal and another $36 million for wharf improvements and construction of a new containerport facility at Conley Terminal. For 1984 and 1985 an additional $9.6 million is scheduled for MassPort's three marine terminals. In the late 1980s and early 1990s much larger amounts of capital, perhaps as much as $70 million, will be needed if the Massport Marine Terminal is to be successfully completed.

Despite these capital investments to modernize and expand the Port of Boston, the Port remains troubled. Total cargo tonnage passing through the Port has declined from 1,000,000 to 700,000 tons between 1979 and 1983. It is expected to fall another 100,000 tons by 1986. Technological change, high labor costs, frequent labor disputes and on-land traffic congestion have all been cited as contributing to the decline in the Port's business. For example, a recent labor dispute over the operation of the new containerport at Conley Terminal delayed the opening of that facility for almost two years. Yet, despite recent troubles, the Port of Boston still handles 51 percent of the dollar value of all shipments to and from Boston. This underscores both the importance of the Port to the City and the need to formulate policies to reverse its recent decline.

Though the Port of Boston is in the midst of hard times, the redevelopment of three of MassPort's underutilized piers seems certain to significantly benefit Boston's economy. The Boston Computer and Communications Market Center (BOSCOM) located at Commonwealth Pier, a new fish processing plant and office space at Fish Pier, plus the mixed-use redevelopment of Hoosac Pier are all underway or planned. At each of these sites MassPort has provided many of the infrastructure improvements needed to attract this wide range of private development.

Between 1978 and 1983, MassPort has expended more than $22 million to upgrade the basic infrastructure of these development sites. However, important supporting infrastructure investments remain to be completed, both by MassPort and other agencies. These include the reconstruction of Northern Avenue and Northern Avenue Bridge, construction of the Seaport Access Road, and parking and boat terminal facilities.

Another area where MassPort is engaged in a public-private mixed-use development is at Bird Island Flats in East Boston. The Bird Island Flats development consists of a new air cargo facility to be constructed by MassPort and a research, production, office and conference complex to be known as the Massachusetts Technology Center. The Technology Center will be constructed privately, but it is supported by several million dollars in basic infrastructure investment by MassPort.

In the public mind, MassPort is primarily associated with Logan Airport. With Logan Airport likely to continue absorbing over half of MassPort's capital investment expenditures throughout the 1980s, this association on the part of the public is understandable. The expansion of Logan parallels the rapid growth of Boston's services-based economy and the region's high-tech development. From 1978 to 1982, despite a severe national recession, passenger service at Logan Airport increased by more than 21 percent, while air cargo tonnage increased by more than 32 percent. Facilitating and responding to Logan's increased passenger and cargo service has been over $145 million in capital investment at the Airport since 1978. Another $48 million is planned through 1985 and the integration of the proposed Third Harbor Crossing into Logan's

internal circulation system will entail upwards of $100 million in capital improvements in the late 1980s and the 1990s.

Logan's rapid expansion has however incurred more than just capital investment costs. There have been a number of disputes between Logan's administrators and their East Boston neighbors. At issue has been the infringement of the expanding airport on East Boston's residential neighborhoods, as well as the noise pollution that has come with Logan's growth. MassPort has responded to these problems by promoting the use of quieter aircraft, changing flight patterns and investing in noise abating capital improvements at Logan and in the surrounding communities. MassPort's capital expenditures for noise abatement totaled $5 million between 1978-83. This total is budgeted to reach nearly $9 million by FY1986 (see Table 32).

As previously mentioned, MassPort has financed the bulk of its past capital investments out of current own source revenues and through the proceeds of revenue bond sales. MassPort's internal funding sources have been supplemented however by a substantial amount of grants-in-aid. Between 1978 and 1983 capital grants received by MassPort totaled almost $44 million or approximately fifteen percent of total Massport capital investments. A similar percentage of grant funds are expected for fiscal years 1984 and 1985. These general financing arrangements, i.e., predominant use of retained earnings and revenue bonds, supplemented by grants-in-aid, are expected to continue indefinitely, with perhaps some reduction in the use of revenue bonds if interest rates climb.

MassPort's dependable stream of internally generated revenues has permitted it to pursue an expansive capital investment program. In addition, the dedication of a portion of MassPort's annual operating

surplus to a Maintenance Reserve Fund has permitted the Authority to adequately maintain its expanding capital stock. Overall, MassPort's investment program has provided essential support to the City's growing economy. It is hoped that a more stable labor environment and the completion of supporting highway investment will unlock the productivity of MassPort's ongoing investments in the Port of Boston. Boston and the entire region are however already receiving the benefits of MassPort's recent and planned investments at Logan Airport, Bird Island Flats, BOSCOM and elsewhere. The City of Boston also receives the benefit of MassPort's in-lieu-of tax payments which, for 1984, totaled $4.9 million.

Air and Water

U.S. STATISTICS

This section presents statistics on civil air transportation, both passenger and cargo, and on water transportation, including inland waterways, oceanborne commerce, the merchant marine, cargo and vessel tonnages, and shipbuilding. Comparative data on various types of transportation carriers are presented in section 22.

Principal sources of these data are the annual *FAA Statistical Handbook of Aviation* issued by the Federal Aviation Administration (FAA); the annual *Waterborne Commerce of the United States* issued by the Corps of Engineers of the Department of the Army; the monthly and annual issues of *U.S. Waterborne Exports and General Imports*, and *U.S. Airborne Exports and General Imports*, the annual *Vessel Entrances and Clearances*, and the monthly *Highlights of U.S. Export and Import Trade*, issued by the Bureau of the Census. In addition, the Bureau of the Census in its commodity transportation survey (part of the census of transportation, taken every five years, for years ending in "2" and "7") provides data on the type, weight, and value of commodities shipped by manufacturing establishments in the United States, by means of transportation, origin, and destination.

Air transportation data are also presented annually by the Air Transport Association of America, Washington, DC in *Air Transport Facts and Figures*. Additional sources of data on water transportation include *A Statistical Analysis of the World's Merchant Fleets*, issued periodically by the U.S. Maritime Administration; *The Bulletin*, issued monthly by the American Bureau of Shipping, New York; and the *Annual Summary of Merchant Ships Completed in the World* and the *Register Book*, published by Lloyd's Register of Shipping, London, England.

Civil aviation.—Federal promotion and regulation of civil aviation have been carried out by the FAA and the Civil Aeronautics Board (CAB). The CAB promoted and regulated the civil air transportation industry within the United States and between the United States and foreign countries. The Board granted licenses to provide air transportation service, approved or disapproved proposed rates and fares, and approved or disapproved proposed agreements and corporate relationships involving air carriers. In December 1984, the CAB ceased to exist as an agency. Some of its functions were transferred to the Department of Transportation, as outlined below. The responsibility for investigation of aviation accidents resides with the National Transportation Safety Board.

The Office of the Secretary, DOT aviation activities include: negotiation of international air transportation rights, selection of U.S. air carriers to serve capacity controlled international markets, oversight of international rates and fares, maintenance of essential air service to small communities, and consumer affairs. DOT's Research and Special Programs Administration (RSPA) handles aviation information functions formerly assigned to CAB.

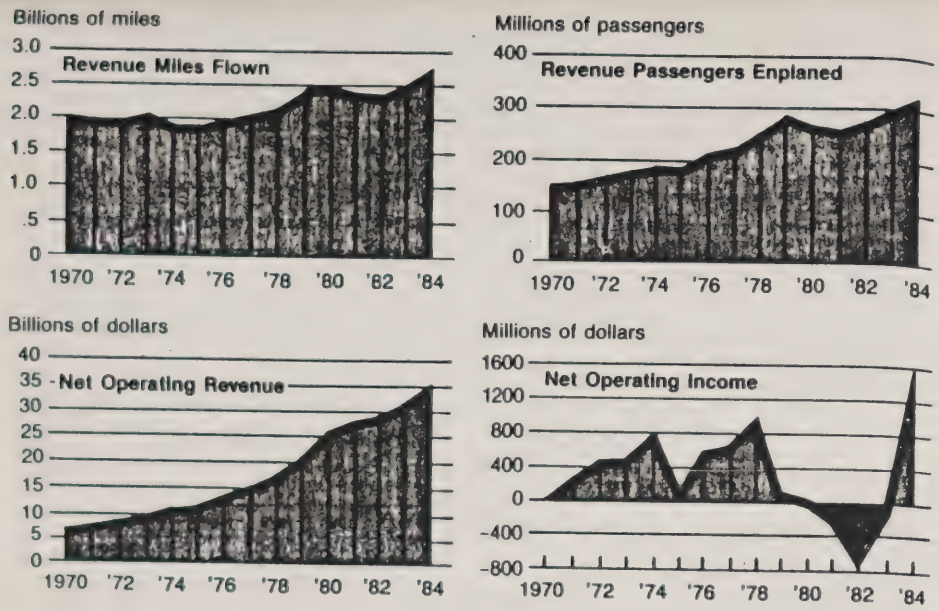
The principal activities of the FAA include: The promotion of air safety; controlling the use of navigable airspace; prescribing regulations dealing with the competency of airmen, airworthiness of aircraft, and air traffic control; operation of air route traffic control centers, airport traffic control towers, and flight service stations; the design, construction, maintenance, and inspection of navigation, traffic control, and communications equipment; and the development of general aviation.

The CAB published monthly and quarterly financial and traffic statistical data for the certificated route air carriers. RSPA continues these publications, including both certificated and non-certificated (commuter) air carriers. The FAA publishes annually data on the use of airway facilities; data related to the location of airmen, aircraft, and airports; the volume of activity in the field of non-air carrier (general aviation) flying; and aircraft production and registration.

General aviation comprises all civil flying (including such commercial operations as small demand air taxis, agriculture application, powerline patrol, etc.) but excludes certificated route air carriers, supplemental operators, large-aircraft commercial operators and commuter airlines.

Air carriers and service.—The CAB previously issued "certificates of public convenience and necessity" under Section 401 of the Federal Aviation Act of 1958 for scheduled and non-scheduled (charter) passenger services and cargo services. It also issued certificates under Section 418 of the Act to cargo air carriers for domestic all-cargo service only. The DOT Office of the Secretary now issues the certificates under a "fit, willing and able" test of air carrier operations. Carriers operating only 60 seat or less aircraft are given exemption authority to carry passengers, cargo and mail in scheduled and non-scheduled service under Part 298 of the DOT (formerly CAB) regulations. Ex-

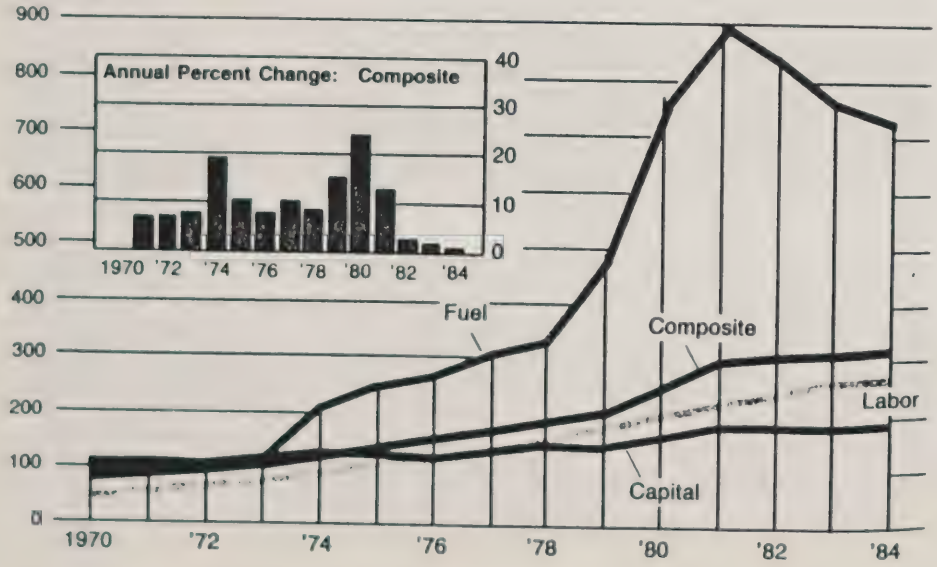
Domestic Scheduled Air Carriers: 1970 to 1984



Source: Chart prepared by U.S. Bureau of Census. For data, see tables 1080 and 1081.

Figure 23.2

Airline Cost Indexes: 1970 to 1984



Source: Chart prepared by U.S. Bureau of the Census. For data, see table 1085

emption authority carriers who offer scheduled passenger service to an essential air service point must meet the "fit, willing and able" test.

Vessel shipments, entrances, and clearances.—Shipments by dry cargo vessels comprise shipments on all types of watercraft, except tanker vessels; shipments by tanker vessels comprise all types of cargo, liquid and dry, carried by tanker vessels.

A vessel is reported as entered only at the first port which it enters in the United States, whether or not cargo is unloaded at that port. A vessel is reported as cleared only at the last port at which clearance is made to a foreign port, whether or not it takes on cargo. Army and Navy vessels entering or clearing without commercial cargo are not included in the figures.

Units of measurement.—Cargo (or freight) tonnage and shipping weight both represent the gross weight of the cargo including the weight of containers, wrappings, crates, etc. However, shipping weight excludes lift and cargo vans and similar substantial outer containers. Other tonnage figures generally refer to stowing capacity of vessels, 100 cubic feet being called 1 ton. Gross tonnage comprises the space within the frames and the ceiling of the hull, together with those closed-in spaces above deck available for cargo, stores, passengers, or crew, with certain minor exceptions. Net or registered tonnage is the gross tonnage less the spaces occupied by the propelling machinery, fuel, crew quarters, master's cabin, and navigation spaces. Substantially, it represents space available for cargo and passengers. The net tonnage capacity of a ship may bear little relation to weight of cargo. Deadweight tonnage is the weight in long tons required to depress a vessel from light water line (that is, with only the machinery and equipment on board) to load line. It is, therefore, the weight of the cargo, fuel, etc., which a vessel is designed to carry with safety.

Historical statistics.—Tabular headnotes provide cross-references, where applicable, to *Historical Statistics of the United States, Colonial Times to 1970.* See Appendix I.

Statistics for States and metropolitan statistical areas (MSAs).— Data for States and MSAs may also be found in *State and Metropolitan Area Data Book 1986.* For cross-references, see Appendix VI.

No. 1080. Certificated Route Passenger/Cargo Air Carriers—Number, Operating Revenues, and Expenses: 1970 to 1984

[**In millions of dollars, except number of carriers.** 1970–1979, includes scheduled and charter operations. Beginning 1980, includes all cargo carriers. Minus sign (–) indicates loss. See also headnote, table 1081, and *Historical Statistics, Colonial Times to 1970,* series Q 591–603]

ITEM	1970	1975	1977	1978	1979	1980	1981 [1]	1982 [1]	1983 [1]	1984, [1] prel.
Number of air carriers	39	33	33	35	49	63	98	98	96	95
DOMESTIC										
Operating revenue	**7,131**	**11,911**	**15,690**	**17,943**	**21,337**	**26,404**	**28,788**	**28,726**	**31,014**	**35,373**
Passenger	6,359	10,290	13,772	15,753	18,930	23,317	25,504	25,440	27,346	31,175
Mail (including subsidy)	205	247	355	334	413	530	591	572	537	555
Express and freight	472	702	978	1,107	1,184	1,582	1,659	1,505	1,582	1,686
Other	94	672	585	749	810	974	1,034	1,211	1,549	1,957
Operating expenses	**7,128**	**11,781**	**15,036**	**16,948**	**21,213**	**26,409**	**29,051**	**29,478**	**31,186**	**33,788**
Flying operations	2,098	3,869	5,229	5,577	7,867	11,029	12,037	11,529	11,370	12,151
Maintenance	1,127	1,595	1,986	2,125	2,421	2,758	2,821	2,709	2,878	2,173
General services and administration	3,157	5,050	6,536	7,556	9,120	10,545	11,943	12,825	14,274	15,615
Depreciation and amortization	745	883	960	1,213	1,352	1,560	1,723	1,876	2,107	2,221
Transport related	(NA)	383	325	477	453	517	526	537	554	627
Net operating income	**3**	**129**	**654**	**995**	**123**	**–6**	**–264**	**–750**	**–171**	**1,587**
INTERNATIONAL										
Operating revenue	**1,913**	**3,063**	**3,774**	**4,332**	**5,191**	**6,543**	**6,390**	**6,435**	**7,163**	**7,871**
Passenger	1,553	2,435	3,019	3,494	4,226	4,984	4,916	4,959	5,361	5,762
Mail (including subsidy)	110	97	88	92	107	175	165	177	152	158
Express and freight	209	381	444	457	534	1,011	984	989	913	1,071
Other	41	150	224	288	325	372	325	309	737	880
Operating expenses	**1,894**	**3,059**	**3,552**	**4,008**	**5,105**	**6,766**	**6,574**	**6,452**	**6,693**	**7,378**
Flying operations	515	1,050	1,170	1,211	1,795	2,775	2,757	2,596	2,490	2,608
Maintenance	241	363	414	458	521	616	540	512	548	656
General services and administration	950	1,345	1,609	1,888	2,289	2,811	2,752	2,795	3,056	3,418
Depreciation and amortization	188	212	238	303	327	385	382	396	389	445
Transport related	(NA)	88	120	148	173	178	144	152	211	252
Net operating income	**19**	**4**	**222**	**324**	**86**	**–223**	**–184**	**–17**	**470**	**493**

NA Not available. [1] Excludes carriers that report system total only (operating revenues of $1,033 million in 1981, $902 million in 1982, $415 million in 1983, and $544 million (preliminary) in 1984, operating expenditures of $986 million, $874 million, $352 million, and $497 million (preliminary) in 1981, 1982, 1983, and 1984 respectively.

Source: U.S. Federal Aviation Administration. From data supplied by U.S. Civil Aeronautics Board, *CAB Air Carrier Financial Data,* annual.

No. 1081. Certificated Route Air Carriers—Summary: 1970 to 1984

[As of **Dec. 31** or for **calendar years.** See text, p. 615. Operations between conterminous U.S., Puerto Rico, and outlying areas included with international. See also *Historical Statistics, Colonial Times to 1970,* series Q 577–590 and Q 624–633]

ITEM	Unit	1970	1975	1979	1980	1981	1982	1983	1984
Domestic operators [1]	Number	35	33	52	63	98	98	96	95
International operators [1]	Number	6	2						
Employment, total [2]	1,000	297	290	341	371	350	330	329	345
Pilots, copilots, and other flight personnel	1,000	33	32	37	39	37	35	35	37
Flight attendants	1,000	34	39	53	57	55	51	58	60
Mechanics	1,000	48	45	45	45	46	43	40	43
Aircraft and traffic servicing personnel	1,000	84	83	98	122	95	88	95	101
Other	1,000	98	91	108	108	117	113	103	104
Fixed-wing aircraft in operation [3]	Number	2,421	2,260	2,466	2,505	2,523	2,468	2,618	2,692
Turbojet	Number	2,041	2,022	2,308	2,336	2,295	2,377	2,492	2,572
Two-engine	Number	519	500	621	652	731	863	974	1,065
Three-engine	Number	631	961	1,232	1,311	1,284	1,260	1,296	1,277
Four-engine	Number	891	561	455	373	280	254	222	230
Turboprop	Number	316	193	152	163	223	88	118	110
Piston	Number	64	45	6	6	5	3	8	10
Average available seats: [4] [5]									
Domestic	Number	110.4	130.4	139.9	143.1	147.2	153.0	154.1	154.4
International	Number	154.9	224.8	259.1	274.5	279.6	283.0	283.6	289.9
Average/hr. speed: [5]									
Domestic	Mi. per hr.	403	403	406	405	403	408	415	415
International	Mi. per hr.	482	482	493	494	494	483	491	495
Jet fuel consumed: [6]									
Domestic	Mil. gal.	7,842	7,558	9,376	9,218	8,984	8,326	8,556	9,468
International	Mil. gal.	2,241	1,949	1,993	2,093	1,826	1,942	1,970	2,205
Revenue-miles flown [5]	Millions	2,426	2,241	2,791	2,816	2,703	2,699	2,809	3,114
Domestic	Millions	2,027	1,909	2,435	2,471	2,396	2,387	2,483	2,767
International	Millions	399	332	355	345	307	312	326	347
Revenue passengers enplaned [5]	Millions	169	205	317	297	286	294	319	344
Domestic	Millions	153	189	293	273	265	274	297	320
International	Millions	16	16	24	24	21	20	22	24
Revenue passenger-miles flown: [5]									
Domestic	Billions	104.1	131.7	208.9	200.8	198.7	210.1	226.9	243.1
International	Billions	27.6	31.1	53.1	54.4	50.1	49.5	54.9	61.3
Average passenger-mile rate: [5] [7]									
Domestic	Dollars	.060	.077	.091	.113	.127	.121	.121	.128
International	Dollars	.050	.072	.077	.075	.095	.100	.098	.094
Express and freight revenue, ton-miles flown [8]	Millions	3,515	4,796	5,964	5,742	5,686	5,482	6,092	6,552
Domestic	Millions	2,216	2,747	3,466	3,277	3,350	3,039	3,385	3,553
International	Millions	1,299	2,049	2,498	2,465	2,336	2,443	2,707	2,999
Mail, ton-miles flown: [8]									
Domestic	Millions	715	683	853	949	998	1,004	1,065	1,159
International	Millions	549	426	372	393	376	400	415	457
Accidents (scheduled passenger service):									
Total [9]	Number	39	28	18	19	25	16	21	12
Fatal	Number	2	2	5	2	4	5	4	1
Fatalities	Number	3	122	352	14	4	235	15	4

[1] The Airline Deregulation Act of 1978 lifted some restrictions on entering new markets. As a result there is no longer a clear distinction between domestic and international operators. Includes all cargo.

[2] Scheduled airlines only. Source: Air Transport Association of America, Washington, DC, *Air Transport Facts and Figures,* annual.

[3] Excludes those used for crew training and general utility purposes, or held for disposal. Beginning 1975, includes aircraft operated by the scheduled all-cargo certificated route air carriers.

[4] Seats per aircraft mile. Passenger seat-miles divided by revenue-miles flown in passenger service.

[5] Scheduled services of all certificated route air carriers, includes all cargo.

[6] Includes all cargo. Beginning 1979 includes very small amount of gasoline.

[7] Passenger revenues divided by revenue passenger-miles flown.

[8] Includes mid-air collisions nonfatal to air carrier occupants (excluded in computation of fatal accidents).

Source: Except as noted, U.S. Federal Aviation Administration, *FAA Statistical Handbook of Aviation,* annual. Includes data from U.S. Civil Aeronautics Board and U.S. National Transportation Safety Board.

[In millions, except as indicated]

ITEM	1970	1975	1978	1979	1980	1981	1982	1983	1984
Revenue ton-miles, all services	20,186	23,534	31,095	34,551	34,656	33,923	35,051	38,011	41,105
Revenue ton-miles, scheduled	18,166	22,186	29,679	33,390	32,603	31,949	32,849	35,756	38,615
Passenger [1]	13,171	16,281	22,678	26,202	25,519	24,889	25,963	28,183	30,446
U.S. mail	1,470	1,097	1,168	1,206	1,318	1,348	1,375	1,450	1,581
Foreign mail	10	12	14	18	24	26	29	30	35
Express	107	29	56	56	56	68	58	66	62
Freight	3,408	4,766	5,763	5,908	5,686	5,618	5,424	6,027	6,490
Revenue ton-miles, charter [2]	2,020	1,348	1,416	1,161	2,053	1,974	2,201	2,255	2,491
Available ton-miles, all services	44,298	49,289	56,869	62,546	66,163	64,245	65,770	68,778	75,940
Ton-mile load factor (percent)	45.6	47.7	54.7	55.2	52.4	52.8	53.3	55.3	54.1
Scheduled services total:									
Revenue passengers enplaned, scheduled	170	205	275	317	297	286	294	319	343
Revenue passenger-miles (bil.)	132	163	237	262	255	249	260	282	304
Available seat-miles (bil.)	265	303	369	416	433	425	440	465	514
Passenger load factor (percent)	49.7	53.7	61.5	63.0	59.0	58.6	59.0	60.7	59.2
Revenue passenger-miles per gallon of fuel (number) [3]	15.4	18.7	22.9	24.3	24.1	24.8	26.1	27.4	26.9
Revenue plane-miles	2,418	2,241	2,520	2,791	2,816	2,703	2,699	2,809	3,114

[1] A passenger ton-mile represents 1 ton of passenger weight, including free and excess baggage, transported 1 mile. [2] Passenger and cargo. [3] For major and national airlines; see headnote, table 1085.

Source: Air Transport Association of America, Washington, DC, *Air Transport Facts and Figures*, annual. Data from Civil Aeronautics Board.

No. 1083. Large Air Traffic Hubs—Summary: 1984

[**In thousands, except number of airports.** For calendar year. Air traffic hubs are cities and standard metropolitan statistical areas requiring aviation services. A large hub is one which enplanes at least one percent of the total enplaned revenue passengers in all services and all operations of U.S. certificated route air carriers]

AREA OR HUB	Airports [1]	AIRCRAFT DEPARTURES			Revenue passengers enplaned	ENPLANED REVENUE TONS		
		Total [2]	Scheduled			Total [3]	Freight and express	U.S. mail
			Number	Completed				
Total, all areas	677	5,449.5	5,498.4	5,374.1	344,831.7	4,968.4	3,579.2	1,371.8
Total, 26 large hubs	40	3,227.1	3,247.9	3,182.5	238,443.7	3,200.3	2,197.8	1,000.4
Atlanta, GA	1	271.1	272.8	269.5	18,920.3	261.6	169.5	92.1
Boston, MA	1	96.5	97.4	94.9	8,702.9	130.3	99.1	30.9
Charlotte, NC	1	76.0	76.5	75.6	4,226.2	32.9	18.6	14.3
Chicago, IL	3	295.3	299.8	293.1	20,030.0	436.5	310.9	125.5
Dallas-Ft. Worth, TX	2	253.1	254.8	252.0	18,482.2	159.8	93.1	66.7
Denver, CO	1	170.8	173.5	169.7	12,812.7	108.8	63.9	44.9
Detroit/Ann Arbor, MI	2	99.4	96.8	94.9	5,357.2	99.9	74.7	25.2
Honolulu, HI	2	50.9	52.8	48.2	5,978.4	114.0	95.5	18.4
Houston, TX	2	139.7	141.4	139.3	9,198.6	53.6	36.7	16.9
Las Vegas, NV	1	59.1	58.9	58.3	4,322.8	7.2	4.3	3.0
Los Angeles/Burbank/Long Beach, CA	4	195.7	198.1	193.8	17,713.8	346.8	279.3	67.5
Miami/Ft. Lauderdale, FL	2	117.2	117.8	115.4	9,949.6	129.7	101.3	28.2
Minneapolis/St. Paul, MN	1	97.2	97.7	96.2	6,127.5	92.5	59.2	32.9
Newark, NJ	1	124.2	126.7	123.2	11,744.0	79.3	49.6	29.7
New York, NY	2	212.1	206.4	200.6	20,008.3	393.9	274.4	119.5
Orlando, FL	1	59.4	59.1	58.3	4,108.4	26.0	19.6	6.4
Philadelphia, PA/Camden, NJ	1	67.1	67.4	66.2	4,365.2	69.7	31.9	37.9
Phoenix, AZ	1	97.4	97.8	96.9	5,750.7	22.8	12.0	10.8
Pittsburgh, PA/Wheeling, WV	1	102.4	103.6	101.7	6,259.9	29.9	9.1	20.8
St. Louis, MO	1	131.1	132.4	129.7	7,946.0	76.4	33.1	43.4
Salt Lake City, UT	1	57.0	57.6	56.7	3,477.7	31.0	18.3	12.7
San Diego, CA	1	45.2	45.3	45.0	3,505.2	17.1	9.3	7.8
San Francisco/Oakland, CA	2	158.8	160.7	156.8	12,239.8	258.9	201.7	57.1
Seattle/Tacoma, WA	2	69.7	70.5	68.8	5,063.1	126.8	95.2	30.6
Tampa/St. Petersburg/Clearwater/Lakeland, FL	2	62.2	62.7	61.7	3,962.2	22.9	13.5	9.4
Washington, DC	2	118.8	119.3	116.4	8,191.1	71.9	24.0	47.8

[1] Airports serving area or hub. Airports certificated under Federal Aviation Regulation (FAR Part 139) served by scheduled and unscheduled air carriers. [2] Includes completed scheduled and unscheduled. [3] Includes foreign mail, not shown separately.

Source: U.S. Federal Aviation Administration, *Airport Activity Statistics*, annual.

[As of **Dec. 31** or for years ending **Dec. 31**, except as noted. See also *Historical Statistics, Colonial Times to 1970*, series Q 604-623]

ITEM	Unit	1970	1975	1979	1980	1981	1982	1983	1984
Airports in operation [1]	Number	11,261	13,251	14,748	15,161	15,476	15,831	16,029	16,075
Heliports	Number	790	1,524	2,108	2,336	2,507	2,712	2,916	2,980
Public	Number	4,260	4,573	4,761	4,814	4,798	4,805	4,812	4,806
Private	Number	7,001	8,678	9,985	10,347	10,678	11,026	11,217	11,269
Airports with runway lights	Number	3,554	4,171	4,631	4,738	4,795	4,844	4,878	4,889
Airports with paved runways	Number	3,805	4,865	5,618	5,833	5,626	6,223	5,441	6,529
Miles of Federal airways	1,000	324.7	403.9	408.5	411.1	415.1	366.2	364.4	364.8
Airport Improvement Program [2]	Mil. dol.	50.5	339.9	624.2	639.0	442.6	407.1	721.5	733.3
Total civil aircraft	1,000	154.5	196.3	251.5	259.4	261.6	259.0	264.9	271.5
Active aircraft [3]	1,000	134.5	171.2	213.9	214.8	217.2	214.0	217.5	(NA)
Air carriers, total [4]	1,000	2.8	2.5	3.6	3.8	4.0	4.2	4.2	4.4
General aviation aircraft [5]	1,000	131.7	168.5	210.3	211.0	213.2	209.8	213.3	(NA)
Fixed-wing aircraft:									
Multi-engine	1,000	18.4	24.6	31.3	31.7	33.5	33.2	34.5	(NA)
Single-engine:									
4-place and over	1,000	64.6	82.6	106.0	107.9	108.0	106.5	107.2	(NA)
3-place and less	1,000	44.9	54.4	62.4	60.5	59.9	57.7	59.2	(NA)
Rotorcraft [6]	1,000	2.2	4.1	5.9	4.9	7.0	6.2	6.5	(NA)
Balloons, blimps, gliders, etc	1,000	1.6	2.8	4.8	5.0	5.0	6.2	5.9	(NA)
Airman certificates held	1,000	1,023	1,052	1,192	1,221	1,163	1,154	1,151	1,170
Pilot [7]	1,000	733	728	815	827	764	733	718	722
Held by women	Percent	4.0	5.2	6.4	6.4	6.2	6.2	6.1	6.1
Airline transport	1,000	34	43	64	70	70	73	75	79
Commercial	1,000	187	189	182	183	169	165	159	155
Private	1,000	304	306	343	357	329	322	319	320
Student	1,000	196	177	210	200	180	156	147	150
Nonpilot [8]	1,000	290	324	377	393	398	421	433	447
Ground technicians [9]	1,000	241	271	307	321	336	352	365	376
General aviation: [10]									
Hours flown [10]	Million	26.0	32.0	43.3	41.0	40.7	36.5	35.2	(NA)
Fuel consumed: [11]									
Gasoline	Mil. gal.	362	397	570	520	(NA)	448	428	(NA)
Jet fuel [12]	Mil. gal.	415	510	736	766	(NA)	887	613	(NA)
Domestic air cargo, revenue ton-miles flown [13]	Million	2,581	3,049	3,794	3,579	3,660	3,472	3,989	4,309
Certificated route carriers:									
Scheduled service [14]	Million	2,215	2,747	3,466	3,277	3,350	3,039	3,385	3,553
Nonscheduled service [14]	Million	80	39	88	[15] 302	[15] 310	[15] 433	[15] 604	[15] 756
Supplemental carriers [16]	Million	285	263	240	([15])	([15])	([15])	([15])	([15])
Aircraft accidents: [17]									
General aviation [6]	Number	4,712	4,001	3,825	3,597	3,502	3,230	3,091	2,991
Fatal	Number	641	636	638	622	654	589	547	529
Rate per 100,000 aircraft hours flown	Rate	(NA)	2.20	1.65	1.71	1.84	1.84	1.76	1.73
Fatalities	Number	1,310	1,258	1,237	1,252	1,282	1,182	1,046	998
Air carrier [18]	Number	55	31	24	15	25	15	21	12
Fatal	Number	8	2	4	–	4	3	4	1
Rate per 1,000,000 aircraft miles flown	Rate	(NA)	.001	.001	–	.001	.001	.001	.0003
Fatalities	Number	146	122	351	–	4	233	15	4
Commuter air carriers [19]	Number	(NA)	46	52	36	31	27	17	21
Fatal	Number	(NA)	12	15	8	9	5	2	7
Rate per 1,000,000 aircraft miles flown	Rate	(NA)	.07	.08	.04	.05	.02	.01	.02
Fatalities	Number	(NA)	28	66	37	34	14	11	45
Air taxis [20]	Number	(NA)	152	160	170	157	135	144	140
Fatal	Number	(NA)	24	30	45	40	31	28	22
Rate per 100,000 aircraft hours flown	Rate	(NA)	.95	.81	1.24	1.36	.95	1.09	.66
Fatalities	Number	(NA)	69	77	103	94	72	62	51
Hijacking incidents, worldwide	Number	83	25	27	40	30	31	33	29
U.S.-registered aircraft	Number	27	12	13	22	8	10	16	9
Successful [21]	Number	18	4	6	13	2	4	13	4
Foreign-registered aircraft	Number	56	13	14	18	24	21	15	20
Successful [21]	Number	37	3	8	9	13	12	6	16

– Represents or rounds to zero. NA Not available. [1] Existing airports, heliports, seaplane bases, etc. recorded with FAA. Includes military airports with joint civil and military use. Includes U.S. outlying areas. Airport type definitions: Public—publicly owned and under control of a public agency; private—owned by a private individual or corporation. May or may not be open for public use. [2] Fiscal year data. Does not include System Planning Grants. Includes U.S. outlying areas. 1970–1982 data are obligated Federal funds for the Airport Development Aid Program. 1983 and 1984 data are appropriated Federal funds under the Airport and Airway Improvement Act of 1982. [3] Registered aircraft that flew 1 or more hours during the year. [4] Includes helicopters.

[5] See text p. 615. [6] Includes autogyros; excludes air carrier helicopters. [7] Includes all active pilots. An active pilot is one with a pilot certificate and a valid medical certificate. Also includes pilots who hold only a helicopter, glider, or lighter than air certificate, not shown separately.

[8] Includes dispatchers, control tower operators, flight navigators and engineers, and ground technicians—mechanics, parachute riggers, and ground instructors. [9] No medical examinations are required; therefore, data represent all certificates on record and include retired or otherwise inactive technicians. [10] In 1980, the 41.0 million flight hours comprised 13.7 hours of business and executive flying, 11.5 hours of commercial flying (including air taxi, aerial applicator, rental aircraft), 5.7 hours of instructional flying, 8.9 hours of personal flying, and 1.0 hours of flying for other purposes. Detail does not add to total due to independent estimating technique. [11] Source: 1970 and 1975, U.S. Bureau of Mines; 1979–1983 FAA General Aviation Activity and Avionics Survey. [12] Includes kerosene-type and naphtha-type jet fuels. [13] Total domestic, includes freight and air express; excludes mail. [14] Includes civilian and military freight and other revenue ton-miles. [15] Beginning 1980, supplementals included in nonscheduled service. [16] Civil and military. [17] Data from National Transportation Safety Board. [18] Beginning 1975, includes all scheduled service of U.S. Air Carriers operating under 14 CFR 121. [19] Beginning 1975, includes all scheduled service of U.S. Air Carriers operating under 14 CFR 135. [20] Beginning in 1975, includes all nonscheduled service of the U.S. Air Carriers operating under 14 CFR 135. [21] Hijacker controls flight and reaches destination or objective.

Source: U.S. Federal Aviation Administration, *FAA Statistical Handbook of Aviation*, annual, and unpublished data. Includes data from U.S. Civil Aeronautics Board.

No. 1085. Airline Cost Indexes: 1970 to 1984

[Covers U.S. major and national service carriers. Major carriers have operating revenues of $1 billion or more; nationals have operating revenues from $75 million to $1 billion]

ITEM	INDEX (1972 = 100)								PERCENT OF CASH OPERATING EXPENSES [1]			
	1970	1975	1979	1980	1981	1982	1983	1984	1970	1975	1980	1984
Composite	**87.8**	**141.6**	**211.0**	**260.5**	**293.9**	**302.1**	**306.6**	**309.4**	**100.0**	**100.0**	**100.0**	**100.0**
Labor	82.9	129.6	191.8	211.5	233.0	250.7	269.5	269.4	46.3	41.2	35.6	34.9
Interest [2]	106.8	114.8	142.7	162.0	181.6	182.4	180.5	190.4	4.3	2.9	3.1	4.0
Fuel	94.2	250.8	494.9	770.8	893.1	842.6	762.8	729.2	12.7	19.1	30.3	24.1
Passenger food	95.1	119.8	136.5	153.0	164.9	162.9	169.4	175.4	3.9	3.4	2.9	3.2
Advertising and promotion	99.3	101.4	109.7	135.2	171.2	197.2	202.1	203.0	2.6	1.8	1.6	2.2
Landing fees	82.2	135.1	174.7	190.8	205.6	211.6	213.7	218.5	2.2	2.4	1.7	1.7
Passenger traffic commissions	80.4	154.0	229.2	318.6	395.7	409.4	436.6	479.9	2.9	3.8	5.3	7.6
All other	91.5	125.8	163.4	178.5	195.6	207.4	215.3	223.5	25.0	25.3	19.5	22.3

[1] Total operating expenses plus interest on long term debt, less depreciation and amortization. [2] Interest on debt.

Source: Air Transport Association of America, Washington, DC, *Air Transport, 1984*, annual; and unpublished data.

No. 1086. Commuter/Regional Airline Operations—Summary: 1975 to 1984

[Calendar year data. Commuter/regional airlines operate primarily aircraft of predominately 60 passengers or less and 18,000 pounds payload of cargo serving short haul and small community markets. Represents operations within all North America by U.S. regional carriers]

ITEM	Unit	1975	1978	1979	1980	1981	1982	1983	1984
Carriers	Number	235	252	258	237	277	245	218	221
Aircraft in service	Number	1,073	1,200	1,350	1,606	1,743	1,857	1,808	1,915
Airports served	Number	747	702	660	605	776	817	854	853
Revenue passengers enplaned	1,000	7,243	11,026	13,972	14,810	15,420	18,600	21,800	26,100
By 50 largest carriers	1,000	(NA)	8,422	11,349	12,167	13,000	16,328	14,293	21,916
Revenue passenger miles	Millions	733	1,279	1,724	1,917	2,090	2,610	3,240	4,170
Cargo pounds [1]	Millions	129	299	346	472	566	628	396	324

NA Not available. [1] Beginning 1983, excludes a major jet express package carrier.

Source: Regional Airline Association, Washington, DC, *Annual Report*.

No. 1087. U.S. Aircraft Shipments: 1970 to 1985

[Value in millions of dollars]

YEAR	TOTAL		CIVIL						MILITARY	
	Units	Value	Large transports [1]		General aviation [2]		Helicopters		Units	Value
			Units	Value	Units	Value	Units	Value		
1970	11,632	7,511	311	3,158	7,292	337	495	49	3,534	3,967
1971	11,161	6,593	223	2,580	7,466	322	453	69	3,019	3,622
1972	13,072	6,220	199	2,787	9,774	558	569	72	2,530	2,803
1973	16,539	8,176	274	3,873	13,646	828	768	113	1,851	3,362
1974	17,192	8,595	317	4,207	14,166	909	809	154	1,900	3,325
1975	16,918	9,355	285	4,006	14,056	1,033	838	266	1,739	4,050
1976	17,865	9,001	217	3,155	15,451	1,226	821	324	1,376	4,296
1977	19,392	9,092	159	2,672	16,904	1,488	984	352	1,345	4,580
1978	19,881	10,179	241	4,308	17,811	1,781	833	371	996	3,719
1979	19,302	15,028	376	8,030	17,048	2,165	1,041	403	837	4,430
1980	14,660	18,845	383	9,793	11,877	2,486	1,353	674	1,047	5,892
1981	11,860	20,157	388	9,731	9,457	2,920	953	636	1,062	6,870
1982	6,248	19,266	236	6,254	4,266	2,000	587	365	1,159	10,647
1983	4,394	25,232	262	8,493	2,691	1,470	401	269	1,040	15,000
1984 [3]	3,620	25,352	185	6,194	2,200	1,500	300	258	935	17,400
1985 [4]	3,793	32,103	293	10,218	2,310	1,700	320	285	870	19,900

[1] Capacity over 70 seats. [2] Includes aircraft kits for exports. [3] Estimated. [4] Forecast

Source: U.S. Department of Commerce, International Trade Administration, *U.S. Industrial Outlook*, 1985.

No. 1088. Aerospace Industry—Summary: 1970 to 1985

[For calander year, except employment and earnings annual averages of monthly figures. Includes Standard Industrial Classification Codes 372 and 376. Industry shipments refer to the total value of all products shipped by establishments classified in that industry. Product shipments refer to the total value of specific products shipped, irrespective of how the establishments which made them are classified]

ITEM	Unit	1970	1975	1978	1979	1980	1981	1982	1983 [1]	1984 [2]	1985 [3]
INDUSTRY DATA											
Value of shipments	Mil. dol.	24,496	29,055	37,451	48,279	58,483	64,837	68,158	77,074	80,050	(NA)
In 1972 dollars	Mil. dol.	26,255	22,207	22,276	25,992	27,899	27,523	26,684	29,200	28,228	32,524
Employment, total	1,000	791	586	586	682	721	732	707	696	714	739
Production workers	1,000	411	312	315	374	387	377	358	343	353	376
Average hourly earnings	Dol.	4.12	6.53	8.33	8.91	9.90	11.19	12.24	(NA)	(NA)	(NA)
Capital expenditures	Mil. dol.	475	478	948	1,550	1,923	2,005	2,216	(NA)	(NA)	(NA)
PRODUCT DATA											
Value of shipments	Mil. dol.	23,327	26,834	33,629	43,663	53,296	58,968	62,167	71,324	73,165	(NA)
In 1972 dollars	Mil. dol.	25,002	20,575	19,990	23,507	25,431	25,015	24,297	26,980	25,775	[4] 29,438
Shipments price index	1972 = 100	93.3	130.8	168.8	187.3	210.7	235.7	255.5	265.1	279.5	(NA)
TRADE DATA											
Value of imports	Mil. dol.	308	747	919	1,395	3,190	4,325	4,242	3,418	4,664	5,025
Value of exports	Mil. dol.	3,398	7,354	9,797	11,520	15,426	17,523	15,335	15,818	15,105	18,880

NA Not available. [1] Estimated except for shipments price index and trade data. [2] Estimated. [3] Forecast. [4] Estimated based on previous growth rate.

Source: U.S. Department of Commerce, International Trade Administration, *US Industrial Outlook, 1985*

No. 1089. Aerospace—Sales, New Orders, and Backlog: 1970 to 1983

[Reported by establishments in which the principal business is the development and/or production of aerospace products]

ITEM	TOTAL (bil. dol.)						PERCENT U.S. GOVERNMENT					
	1970	1975	1980	1981	1982	1983	1970	1975	1980	1981	1982	1983
Net sales	24.8	29.5	58.4	69.9	75.5	82.8	66.3	58.6	45.7	47.2	56.0	59.4
Complete aircraft and parts [1]	10.4	11.3	22.6	25.1	26.0	27.5	54.8	46.9	29.6	32.7	47.0	49.9
Aircraft engines and parts	3.1	3.4	6.9	8.5	7.6	8.6	61.5	47.0	(NA)	(NA)	(NA)	(NA)
Missiles and parts	5.4	6.3	8.4	9.7	12.0	12.7	96.9	93.7	(NA)	(NA)	(NA)	(NA)
Other products, services	5.9	8.5	20.5	26.6	29.9	34.0	(X)	(X)	(X)	(X)	(X)	(X)
Net, new orders	21.2	29.0	70.4	74.9	86.6	92.9	71.4	64.1	47.6	53.7	64.3	67.1
Backlog, Dec. 31	24.7	35.0	90.5	94.7	105.8	116.3	52.1	63.2	41.1	46.7	56.8	63.9

NA Not available. X Not applicable. [1] Except engines sold separately.

Source: U.S. Bureau of the Census, *Current Industrial Reports*, series MQ-37D.

No. 1090. Aerospace Industry Sales, by Product Group and Customer: 1970 to 1984

[In billions of dollars. Due to reporting practices and tabulating methods, figures may differ from those in table 1089]

ITEM	CURRENT DOLLARS						CONSTANT (1972) DOLLARS [1]					
	1970	1975	1980	1982	1983	1984	1970	1975	1980	1982	1983	1984
Total sales	**25.6**	**29.7**	**54.7**	**67.8**	**80.0**	**83.5**	**27.4**	**23.5**	**26.4**	**26.6**	**28.9**	**27.8**
PRODUCT GROUP												
Aircraft, total	14.1	16.4	31.5	35.5	42.4	41.9	15.1	13.0	15.2	13.9	15.3	13.9
Civil [2]	4.4	6.5	16.3	11.0	12.4	10.7	4.7	5.1	7.9	4.3	4.5	3.6
Military	9.7	10.0	15.2	24.5	30.1	31.2	10.4	7.9	7.3	9.6	10.9	10.4
Missiles	4.1	3.8	6.5	10.4	10.3	11.3	4.4	3.0	3.1	4.1	3.7	3.8
Space	4.7	4.7	7.9	10.5	13.9	16.3	5.1	3.7	3.8	4.1	5.0	5.4
Related products and services [3]	2.6	4.8	8.8	11.4	13.3	13.9	2.8	3.8	4.3	4.5	4.8	4.6
CUSTOMER GROUP												
Aerospace, total	22.9	24.9	45.9	56.4	66.6	69.6	24.6	19.7	22.1	22.1	24.1	23.2
DOD [4]	14.6	13.1	22.8	34.0	41.6	46.0	15.7	10.4	11.0	13.3	15.0	15.3
NASA [5] and other agencies	3.0	2.8	4.1	4.9	5.9	6.1	3.2	2.2	2.0	1.9	2.1	2.0
Other customers [6]	5.3	8.9	19.0	17.5	19.2	17.5	5.6	7.1	9.2	6.8	6.9	5.8
Related products and services [3]	2.6	4.8	8.8	11.4	13.3	13.9	2.8	3.8	4.3	4.5	4.8	4.6

[1] Based on aerospace composite price deflator supplied by the U.S. International Trade Administration. [2] All civil sales of aircraft (domestic and export sales of jet transports, commuters, business and personal aircraft and helicopters). [3] Electronics, software, and ground support equipment, plus sales of non-aerospace products which are produced by aerospace manufacturing establishments and which use technology, processes, and materials derived from aerospace products. [4] Department of Defense. [5] National Aeronautics and Space Administration. [6] Includes civil aircraft sales (see footnote 2), commercial space sales, all exports of military aircraft and missiles and related propulsion and parts

Source: Aerospace Industries Association of America, Inc., Washington, DC, *Aerospace Facts and Figures, 1985/86*